RAILROAD GAZETTE

FRIDAY, MAY 17, 1901.

CONTENTS

Contributions

Effect of Braking on Rail Steel.

New York, May 11, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Referring to the article "The Influence of the Brakes on Life of a Rail" in your issue of May 10, p. 313, I beg to state that a broken rail end has never been known where the "Stossfangschiene" (Barschall rail joint) has been in use. This fact may be of interest to Prof. J. O. Arnold and other of your readers, and may be a practical way of overcoming the deterioration of rail ends, "over which high speeds and severe braking had been the rule." At any rate I should consider it worthy of investigation if the use of my joint does not prevent this known deterioration, rather than a search for "a chemical composition which, combined with practical reheating and rolling conditions, will give a rail incapable of deteriorating in any circumstances in which it may be placed during a period of 20 years." This problem may even now be solved by purely a mechanical device.

MAX BARSCHALL.

Draft Gear.

Works of the Dayton Malleable Iron Co.,
Dayton, Ohio, May 4, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In your issue of the 19th ult. you publish a communication from Mr. H. H. Westinghouse, in which statements are made and theories set forth which I think are open to question.

The first of these is the statement that comparative tests of the single spring and double spring draft gear must be made in order to establish the relative merit of the two devices, and so far as known such comparative tests have not been made. I do not believe it is possible to devise a test which will give positive information regarding any device in the nature of a draft gear. I have known devices of this nature to successfully withstand most severe punishment in both laboratory and road tests and then fail in regular service.

Single and double spring draft gears have been in use on cars up to and including those of 80,000 lbs. capacity for a number of years, and thousands of cars in service in all parts of the United States equipped with the double spring rigging are giving excellent satisfaction, while single spring riggings in similar service are failing. The failures of couplers and other parts of the car are very much reduced or eliminated where the double spring rigging is used. Information which will prove this can be obtained from a number of different railroads, and there is no necessity of attempting to obtain additional proof by making tests which always admit of error.

If the additional recoil due to added spring capacity was as injurious as claimed by Mr. Westinghouse, the failures of draft riggings, couplers and cars would be greater with double spring riggings than with the single. As such is not the case this proves conclusively that the recoil is not a serious matter.

The double spring rigging is applied to probably 90 or 95 per cent. of all the cars of 100,000 lbs. capacity now running. On some of the first cars built the attachments were made too light, but these have been strengthened and there are records of several hundreds of these cars having been in regular service for at least one year without a single draft rigging failure except in wrecks.

In referring to a single spring rigging, I mean a rigging fitted with one M. C. B. 6¼-in. x 8-in. spring having from 19,000 to 20,000 lbs. capacity, and in referring to a double spring rigging I mean one fitted with two such springs of the same dimensions and capacity. This explanation is important as draft springs vary in capacity from 10,000 lbs. up to 28,000 lbs. capacity.

The second statement made by Mr. Westinghouse is that the spring draft gear has not withstood or has not been subjected to as severe tests as the friction gear without breakage of cars or draft gear. In attempting to prove this he argues that two locomotives cannot jerk a train as severely as one having a tractive power equal to the two combined, and that a jerk test made with light cars is more severe than one made with loaded cars. I think both of these statements are open to argument, but even granting they are true the double spring rigging has been subjected to much more severe punishment in tests than it ever should or is liable to receive in service, and in service it has been a successful and satisfactory device for a number of years.

The third statement to which I take exception is as follows: "I have had considerable practical experience with operation of trains in regular service, employing draft gear of the kind described, and, under conditions that commonly occur in such service, perfectly sound M. C. B. couplings were frequently broken," etc. This is undoubtedly correct so far as it goes, but it does not go far enough as it opens up the very large subject of the strength of the M. C. B. coupler. It is a well known fact that a large proportion of these couplers as applied are totally inadequate in strength and some of the widest used and best known devices are on the point of being abandoned in favor of new ones of increased strength. Couplers which had ample strength for any service to which they could be subjected at the time when the M. C. B. coupler was adopted are to-day in view of the tremendous increase in weight and capacity of locomotives and cars wholly inadequate. It is folly to attempt to help out these weak and inefficient couplers by introducing an elaborate and expensive draft gear for bolstering up their weaknesses. One dollar spent in increasing their strength will do more to reduce the break-in-two than many dollars spent on elaborate cushioning devices. It is, however, important to have a good cushion of some kind against both pulling and buffing blows and there are couplers in use, which, with 40,000 or 50,000-lb. draft spring capacity behind them will stand any punishment they can receive in fair usage in modern service.

In speaking of the inadequate cushion provided by the spring draft gear Mr. Westinghouse says: "There is no provision for distributing or dividing the energy which produces the strains, for whatever energy is absorbed by the springs during the movement in one direction is simply stored up and subsequently returned by reaction *in full measure*, to cause movement and *corresponding* strains in the opposite direction." (The italics are mine.) If this statement is true Mr. Westinghouse has discovered perpetual motion, and a weight dropped from a given height on the top of a spring will rebound to its original position and continue to do so indefinitely.

I do not know of any tests or experiments having been made by disinterested parties which prove that a friction gear will absorb a sufficient amount of the strain to which a draft rigging is subjected, to reduce the damage done to equipment in regular service. So far as I am able to judge all such claims for this type of rigging are based purely on theory. It would be a very simple matter to ascertain whether the theory is correct, and with very little trouble a test could be made which would be interesting, to say the least.

The advocates of the friction gear seem to hold the belief that the recoil is in the nature of a destructive blow, and in this I think they are in error, as carefully observed tests have proved that the recoil is in the nature of a surge which is in no way destructive. It seems to me that in many cases the recoil has been confused with slack. A large number of cars are equipped with single spring draft riggings of only 10,000 lbs. capacity. When these cars are placed behind locomotives of from 30,000 to 40,000 lbs. tractive power the springs are immediately exhausted or take a permanent set, and the coupler has from 1 in. to 1½ in. of unresisted movement. It goes without saying that such a condition is destructive to equipment. The introduction of two springs of 20,000 to 25,000 lbs. capacity each is an entirely different matter, and the heaviest locomotives in service to-day are held down by this rigging to blows which are destructive only to such parts of the equipment as are abnormally weak.

I have for some time past held the belief that the results of tests or service obtained by a friction gear can be duplicated with a spring draft gear, and that the latter is very much lower in cost, more easily kept in repair, embodies less dead weight and fewer parts. I am still of that opinion and believe that all of the tests, both laboratory and service, which have been conducted by disinterested parties tend to show that I am correct. I am ready to produce a spring rigging at any time which will duplicate any tests made with the friction device.

CLEMENT F. STREET.

There has long been a sleeping car in one train between Berlin and Warsaw, a distance of 390 miles, but the unfortunate passenger was compelled to get up and change cars at the Polish (Russian) border at 3 o'clock in the morning. It is now announced that, dating from May 18 of this year, the sleeping cars will run through between the two cities. Berths for the journey cost $2.50 first-class and $2 second-class. If you engage a berth beforehand at the station, you pay 12 cents in addition; but for that sum you may engage one by telegraph from any Prussian station.

Which is the Best Site for a Hudson River Bridge at New York?

Passenger Traffic.

The railroads reaching Jersey City were built when New York occupied mainly the south end of Manhattan Island, and they endeavored to bring their passengers as near to this as possible; their terminals in Jersey City are, therefore, with the exception of that of the West Shore (of later date and at Weehawken), all on the Hudson from opposite the Battery to opposite Christopher street. From these their passengers reach the business district by ferry and a short walk from West street to their destinations.

For the commuters living in New Jersey and doing business in lower New York the present facilties cannot be much improved by any one bridge, certainly not by any one at or above Twenty-second street. To reach the bridge at Twenty-second street from lower New York, elevated (or underground) railroads would be the only ones available. These will have electric motive power while the suburban railroads in New Jersey are steam locomotives. The trains of the latter would, therefore, come to New York, and the long distance south-bound passengers would change cars to the elevated at the terminal. New lines of elevated railroad might be built from the west end of the bridge; Jersey City, Hoboken and more distant districts might be served by them. Then only it would be possible to give through service over the bridge without change for long distance passengers. The railroads in New Jersey which partly own ferries would have no interest to carry passengers destined for lower New York to the western terminus of a bridge above Twenty-second street at lower rates than to their present termini in Jersey City. The passengers using the bridge with the intention of reaching lower New York from either Jersey City or the western and southern suburbs in New Jersey, would save little or no time, and would have to pay instead of 3 cents or less on the ferry, the fare across the bridge and from the bridge to the business district.

It is therefore evident that no bridge could expect to secure much of this traffic, even should it charge no more than the ferries. The bridge would offer little if any advantage either in comfort or time: and the charge would be more for most of the passengers by the amount of the fare from the terminus of bridge to their destination in New York. The bridge would derive little or no profit from any of this traffic it would obtain, since a charge of 3 cents per passenger would not be profitable, even should the traffic be equal to the whole capacity of the bridge. It is therefore injudicious to be guided in the location of the bridge by any attempt to capture it.

There is a high plateau along the Hudson in New Jersey with various little-developed suburbs on, and back of it, opposite Central Park and extending further north. This region, had it a bridge connecting it with the business, amusement, and shopping district of New York, would be as available for residence purposes as the region in New York directly west of Central Park. It could be reached from lower New York in from 30 to 40 minutes, and it would be more desirable than most of the New Jersey suburbs which can only be reached in little less than an hour. Had it a bridge at Fifty-ninth street it could reach the shopping and amusement center of New York in 15 minutes. There can be no doubt that an immense suburb would immediately grow up in this district were it accessible. It can only be made really accessible for business men of New York by a through elevated railroad over the bridge and to the Battery. A bridge at Twenty-second street would be as good for this purpose as one at Fifty-ninth street, but the former would not give as good connection with the amusement and shopping centers which are above Twenty-second street. A ferry could not serve this district as quickly as a bridge, since the distance by ferry would be no less than by rail, and the river has here to be approached by a slow ride in the cars, which, with the changes and their delays, would cause great loss of time. This traffic a bridge would get even should it charge 5 cents more than a ferry.

The most profitable part of the passenger traffic of any Hudson River bridge would be that of long distance passengers with baggage. Experience and reasoning alike show that it is most important to carry these without change to a place as near as possible to their homes or hotels. The New York terminal station for this traffic ought, therefore, to be in the center of the residence and hotel district, and this will be in the near future rather above than below Fiftieth street and Broadway, where the terminal of the Fifty-ninth street bridge is located. A station at Twenty-second street will be by this time at the lower end rather than the center of it.

For these long distance passengers and their baggage a bridge can well charge 15 to 25 cents per passenger without losing their patronage. This is the really profitable part of the passenger business and ought to be most considered in selecting a site. One such passenger is more

than 10 times as valuable as a source of profit for a bridge than one who has to be taken away from a ferry offering equally good service.

To sum up: There may be distinguished six sources of revenue for a passenger bridge.

First, The existing traffic between lower New York City on the east and Jersey City, Hoboken and the western and southern suburbs in New Jersey on the west. This traffic forms the bulk of the suburban traffic of the present. It is excellently and cheaply served by the present ferries, the trolleys in Jersey City and Hoboken and the suburban railroads. Any bridge at or above Twenty-second street can secure little of this traffic and this little only at unprofitable charges.

Second, The suburban traffic between central New York City (between the two bridges), and the western and southern New Jersey suburbs inclusive of Jersey City and Hoboken; for this the lower bridge is better situated than the upper one. This traffic is not very large at present and much of it is subject to severe competition from the present ferries.

Third, The traffic between New York City south of both bridges and the New Jersey suburbs north of them, and between New York north of both bridges and the New Jersey suburbs south of them; this can be about equally well served by both bridges.

Fourth, The traffic from the region near the eastern terminus of each bridge to the region near the western terminus of it. The two bridges are on an equal footing in this respect.

Fifth, The traffic from the shopping and amusement centers to all the suburbs in New Jersey. The northern bridge having its terminus in the center of this district is better situated for securing this traffic, especially with the northern suburbs in New Jersey, and more and more so in the future because this district is moving north.

Sixth, The long distance traffic of passengers with baggage. This will be mostly secured by the bridge having its terminal nearest the hotel and residence district.

The southern bridge is better for classes 1 and 2; both bridges are about equally good for classes 3 and 4; the northern bridge is better for classes 5 and 6. Classes 5 and 6 are the most profitable on account of the impossibility of efficient ferry competition. Class 5 promises to grow rapidly on account of the excellent facilities offered by a bridge at Fifty-ninth street for the development of the northern suburbs in New Jersey; and both classes will grow quickly on account of the absence of effective ferry competition. These classes include the most profitable part of the traffic.

While it would therefore appear at a superficial glance that the southern bridge, being nearer the bulk of the present traffic, is better situated for a passenger bridge, investigation seems to show that whatever advantages the southern bridge may have at present in securing a large number of passengers by making a very low charge, the profitable traffic, not subject to serious competition from the ferries, can better be secured by the northern bridge at the beginning; and it is better situated for the development of new profitable traffic in the future.

Freight Traffic.

Neither bridge could do much freight traffic (except in quick freight, including express, milk, and perishable goods) without a railroad connecting with the piers on West street, warehouses along its route, and a great switching yard in New Jersey to properly make up the freight trains which are to go either over the bridge to New York, or from New York to the various railroads. It would hardly be practicable to make a connection with such an approach from a bridge at Twenty-second street, and this is not contemplated. The bridge at Fifty-ninth street is intended to connect with such an approach.

In 1896 an estimate was made by Raymond E. Dodge of the freight crossing the Hudson between New Jersey and New York in 1895. The amount was then, exclusive of the freight from the West Shore R. R., which could not be ascertained, and exclusive of that to and from Mott Haven and Long Island over 25,000,000 tons, and 1,300,000 empty freight cars. The lighterage charges were then 60 cents a ton and $2 for an empty car. This represents a total charge of $17,600,000.

In the same year about 85,000,000 passengers crossed the river between New Jersey and New York. The total revenue from them at 3 cents per passenger amounts to $2,550,000. It is, therefore, apparent that the existing freight traffic is much more important than the passenger traffic.

By reducing the above charges one-half a large fraction of this traffic can be secured by a bridge with a proper freight approach in New York, and this will form the greater part of the earnings of a bridge. Both the freight and passenger traffic have largely increased and will increase much more before any bridge is completed. A bridge will transport its passengers not only to West street but to the center of the city, its passenger earnings from those passengers naturally contributory to it will therefore be much more than 3 cents. It will also transport much of the freight to places which cannot be reached by lighters; its freight earnings will therefore be not altogether at the expense of the present lighterage business.

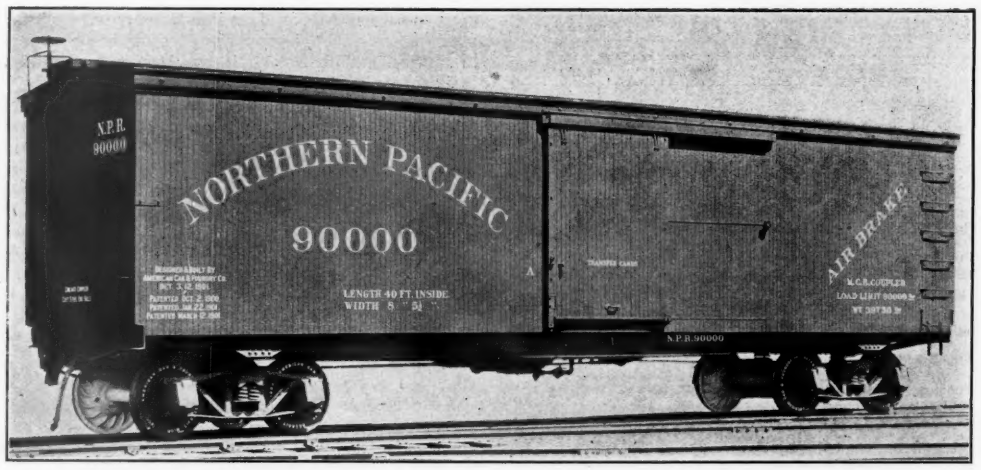
The cost of a bridge at Fifty-ninth street, with connections to the railroads and a big freight yard in New Jersey, with approach, terminal station, West street approach, and the necessary real estate in New York, is estimated at $75,000,000; without the West street approach at $60,000,000. The cost of a bridge at Twenty-second street, with approaches and terminals, is variously estimated at from $100,000,000 to $110,000,000. A bridge at Fifty-ninth street without the West street approach is therefore a more promising financial proposition than one at Twenty-second street, but it has not succeeded so far in enlisting capital. With the West street approach, if this can be obtained on reasonable terms, it would be sufficiently attractive to secure financial support.

In the foregoing argument the assumption is made that the terminal for a bridge at Twenty-second street would be at Twenty-second street and Sixth avenue, because of choice of position for the bridge leads to the inference that it is the intention to capture the suburban passenger traffic from lower New York. A terminal further north for this bridge would put it in better position to take this profitable traffic; and a look at a map giving no elevations would indicate that with a station at Fortieth street such a bridge would have the best site for a connection with the steam railroads. The objection to this route is however that the tracks on the bridge are at an elevation of 160 ft. above high water, and the bridge is too near these roads to make favorable and cheap connection with them at moderate grade.

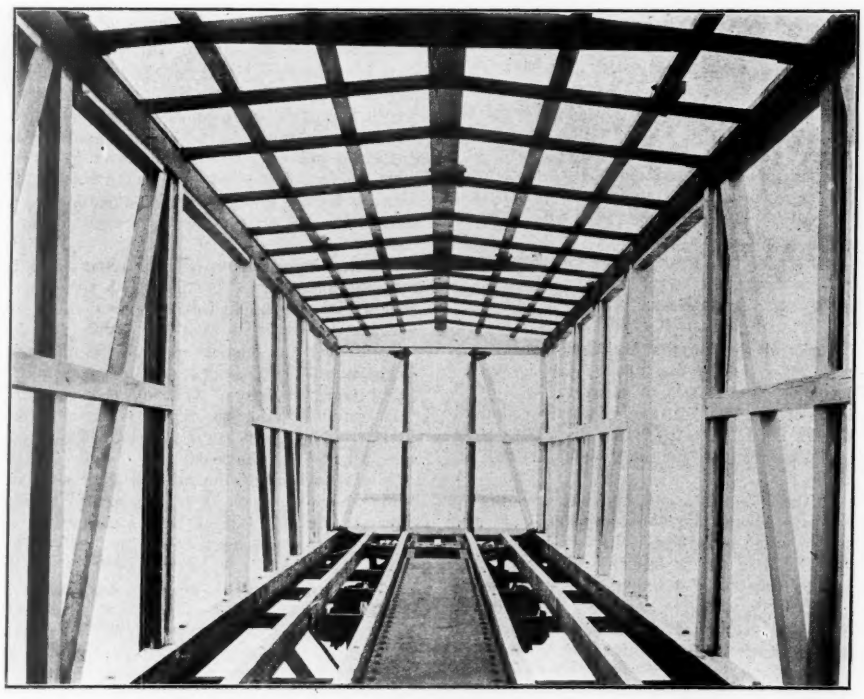
The bridge at Fifty-ninth street comes to the surface in New Jersey 1,600 ft. from the river and is as near the steam railroads as is desirable for a connection with them by two comparatively cheap side hill roads at favorable grades. The region near the Hudson, at and north of Fifty-ninth street, is at the level of the bridge, and can therefore be directly connected with New York, which is not possible with low-lying Jersey City and Hoboken. A bridge directly west from a terminal in the center of the hotel and residence district would give the shortest line to all points in New Jersey, but its approach in New York is too short to offer favorable grades for a terminal of reasonable elevation above the street. For connection with a West street approach Fifty-ninth street or site further north is most favorable. J. G.

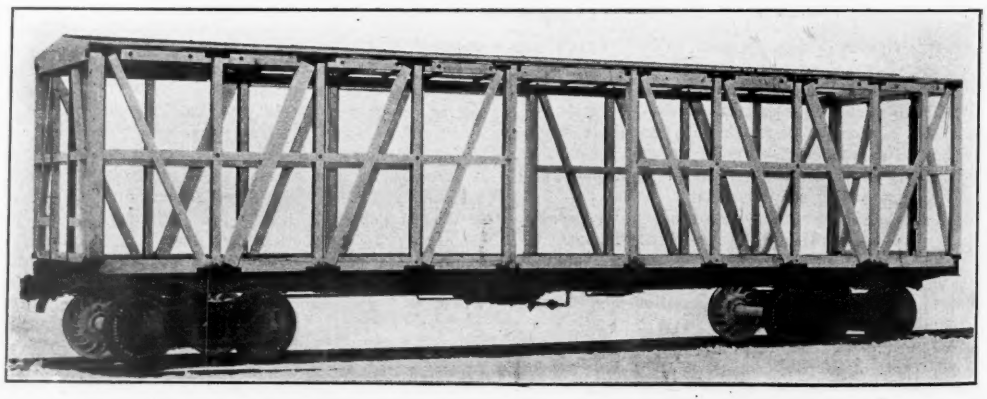
45-Ton Box Car of the American Car & Foundry Co.

The accompanying engravings show a sample 90,000-lbs. capacity box car recently built for the Northern Pacific by the American Car & Foundry Co., from designs of Mr. George I. King, Manager of the Steel Car Department. Its principal features are a structural steel underframe, and side trusses designed to carry part of the load. The actual weight of the car empty is 39,600 lbs. The length inside is 40 ft., the width 8 ft. 6 in., and 90,000 lbs. of corn or rye brings the load line 5 ft. 10 in.



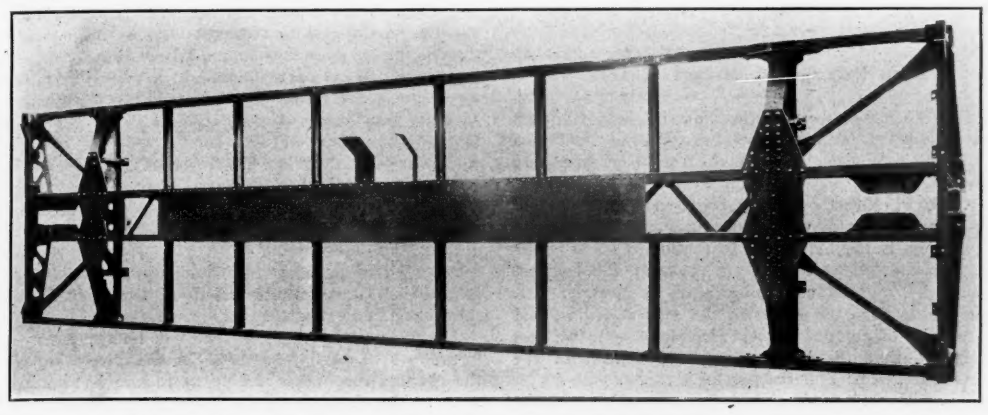
45-Ton Box Car With Steel Underframe—American Car & Foundry Company.





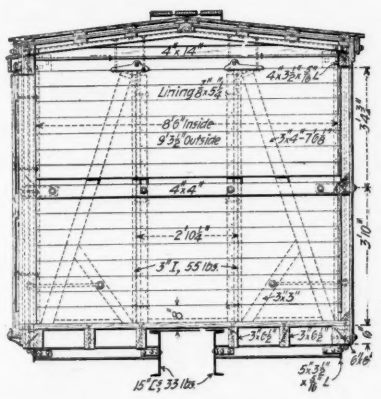
Framing of 45-Ton Box Car—American Car & Foundry Company.

from the floor; for wheat the load line is 5 ft. 6¼ in. from the floor. The car was designed in accordance with Mr. King's specifications published in part in our issue of Jan. 4 last, and it is considered satisfactory when viewed from the standpoint of the ratio of dead weight to paying freight, as well as from the standpoint of first-class construction.



Structural Steel Underframe for 45-Ton Box Car.

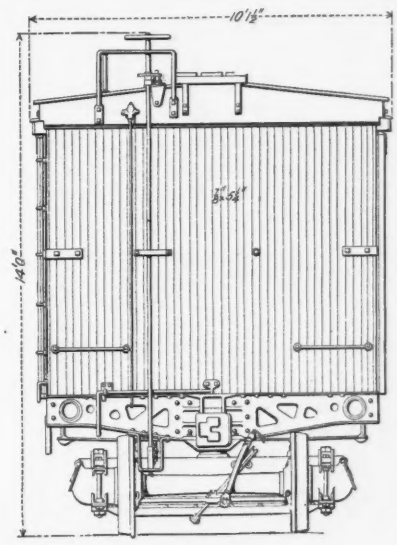
With reference to the weight, Mr. King says that he recently noted at random the marked weights of some 18 different wooden 60,000-lbs. box cars, and the weights of these averaged about 30,450 lbs.; the average length was about 36 ft. inside. Using this average figure, the weight of the 30-ton wooden car when loaded to its maximum capacity is 96,450 lbs.; and of this the maximum revenue freight is a little over 68 per cent. With the sample car shown, the maximum revenue freight is about 69 per cent. of the whole weight of the car, or practically the same ratio. The point is that it is not possible to materially improve the ratio of dead weight to paying freight found in prevailing types of 30 and 40-ton wooden box cars. The superstructure remains essentially the same as in existing cars, while the wooden underframe, which is admittedly weak, is to be replaced by a sufficiently strong steel construction. About the only opportunity to keep the dead weight down is to use the side trusses to support their proportion of the load and this idea has been carried out in the sample car shown.

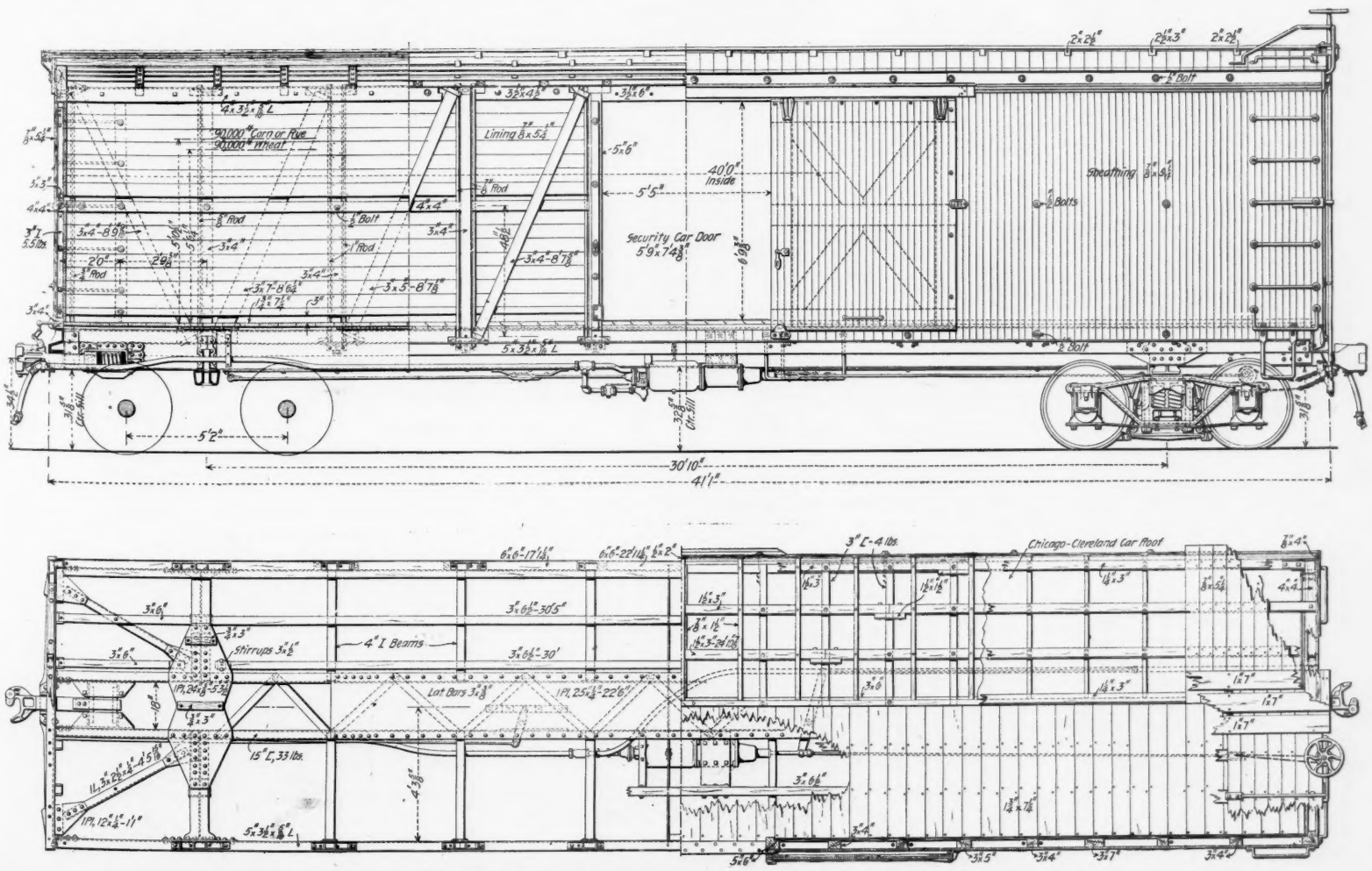


When completed the side frames of this car showed an average cambre of approximately ⅞ in. at the center, and to test the side trusses, 100,000 lbs. of pig iron was distributed in three rows lengthwise of the floor. There was one row in the center of the car and one row along each side. The result was a total center deflection of each side truss of about ¼ in. leaving a cambre of ⅝ in. Half of the load was then removed from the center of the car to one end, in order to see whether these unbalanced forces would seriously distort the door frame. It was found that the original lengths of the door frame diagonals were not altered more than ¼ in., and this at one door only. When the whole load was removed, the side frames resumed their original position; at least the difference was not measurable. This car was designed for loads not in excess of 90,000 lbs. uniformly distributed; the 100,000 lbs. loading used in the test, with one-third on each side truss, may be considered exceptional.

Referring to the engravings, it will be seen that the center sills are two 15-in., 33-lb. steel channels with the flanges turned out; the sill spacing is 19 in. In order to strengthen the center sills between the bolsters, a ¼-in. cover plate is riveted to the top flanges of the channels, and this plate extends practically the distance between the bolsters. The bottom flanges of the center sills, between the bolsters, are tied together by lattice bars. The side sills are 5 x 3½ x 5/16 in. angles with the horizontal member extending outward. The vertical members of the side sill angles are riveted direct to connection plates upon the ends of the body bolsters. The floor beams are 4-in. I sections. At one end they are secured near the upper edges of the center sills by connection angles and at the other they are joined to the side sills. The body bolsters are shown in detail. A steel casting is interposed between the deep center sills, and web castings fill the spaces between the center sills and the side sills. In addition to being riveted to the sills, wide top and bottom cover plates are used to connect these parts. Another interesting detail is the cast-steel end sill which is clearly shown by the drawings. Being a steel casting, these are combined in a single piece, all the brackets for the sill connections, the push pole pockets and the reinforcing flanges required where the sill is cut out for the coupler. The draft gear attachments are also steel castings riveted direct to the center sills.

The sides of the car are essentially two parallel trusses having 4 x 3½ x 5/16-in. angles for upper chords, 5 x 3½ x 5/16-in. side sills for lower chords, and wooden posts and diagonals and tension rods. The posts and diagonals are received in suitable malleable iron pocket castings riveted to the side sills and upper chords. It will be seen that the sections of the diagonals and the rods are increased from the door posts to the body bolsters for the purpose of carrying the increased loads to



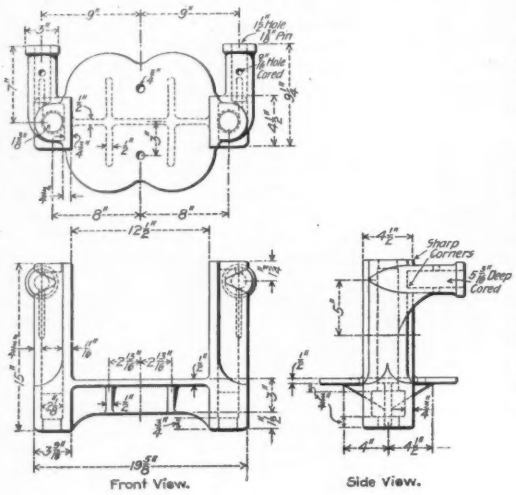


45-Ton Box Car With Steel Underframe—American Car & Foundry Company.

which these diagonals are subjected as their position approaches the point of support. The nuts on the vertical rods all bear directly on the horizontal flanges of the upper and lower metal angles. The floor beams are arranged to concentrate the floor loads at the panel points, and they support the wooden intermediate sills or stringers. In order to provide a nailing base for the sheathing a furring strip is set into the upper chord angle and held in place by bolts. In the same way longitudinal nailing strips are mounted on the side sills, and this strip has its outer face recessed for the vertical posts and diagonals. The flooring, 1¾ in. thick, is nailed to the longitudinal wooden stringers.

The roof of the car is supported by carlines made of channels, cambred to conform to the shape of the roof. The ends of the carlines rest on spacing brackets or saddles attached to the upper chord angles so as to prevent displacement. Threaded strap bolts are riveted to the sides of the carlines at the ends, which bolts pass through the side walls and fascia plates and act as tie rods to hold the top of the car against lateral bulging.

The cast-steel truck bolster used with this class of cars is shown by the detail drawings as is also the design of the arch bar truck frame, spring plank and end casting, all of which have been designed with a great deal of care.



Steel End-Casting for Truck.

Train Parting and Skidded Wheels.

At the March meeting of the New England Railroad Club the subject for discussion was "Parting of Trains and Skidded Wheels." Extracts from the discussion follow:

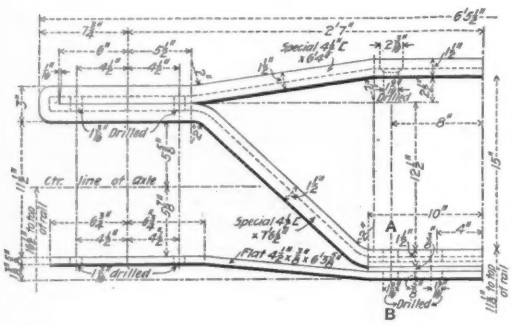
Mr. H. S. Kolseth, Westinghouse Air Brake Company—The subject is very important, and the time allotted to me is too limited to do justice to it. Parting of trains (in freight service) is probably the heaviest expense the railroad companies have to meet. . . . If the empty cars are placed in the rear of trains, and the road is of uneven grade, with sags, etc., we can readily see that the braking must be done with the greatest care, to prevent the parting. . . .

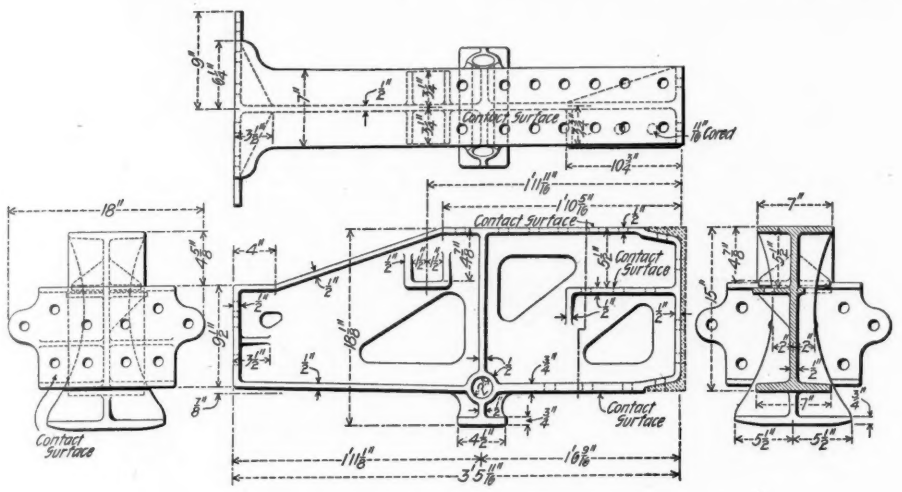
. . . Would it not be time and money well spent if the order should be given to place all air-braked cars together? This would insure obtaining the maximum braking force instantly, in case it was needed, and in case a train is parted accidentally, either by coupling or draft gear giving out, we can readily see that the more air-brakes there are in operation the less is the liability for damage. I recently heard of a train which parted, and considerable damage was done. This train had 73 cars, 57 of which were equipped with air-brake. The cars were, however, placed in such a way that only 31 brakes could be operated. This train had 78 per cent. air-braked cars, but by not placing the air-brake cars together, there was a loss of 35 per cent.

As far as skidded wheels are concerned, a careful investigation should be made before any one is blamed. All air-brake instructors agree, and instruct, that if a train, or a single car is left on a siding, even if equipped with air-brake, this should not be depended on, but the hand brake should be set. Another crew pick up these cars, and if they have the air-brake equipment, they are charged up with the rest, and then tested, by applying the brake. The trainmen see that brake goes on, and the engineer is signaled to release, and they may also note that the piston goes back in the cylinders, but this is not all that is required, as a number of cases have been found where the brake shoes were frozen to the wheels, and it does not take long to make flat spots in the wheels, and furthermore, when train is moving at slow speed, the wheels are picked up and skidded very easy. In the very severe climate of New England, it seems that another order should be given train crews, namely, after hand brakes were let off, air-brake applied and released, also see that the shoes are not frozen to the wheels, especially on cars picked up on sidings. A railroad company here in the East say that nine-tenths of the skidded wheels they have is during the winter months.

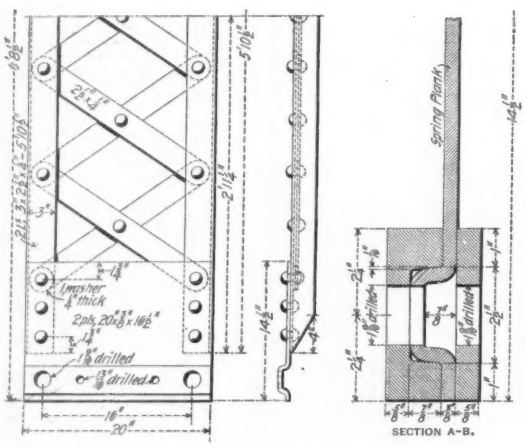
Another case is (and what we will find more frequent in the future) as the wear of the triple valve takes place, the chances for brakes failing to release is aggravated. . . . Terminal plants for inspection, and care of the air-brake, are a necessity, and when the principal parts need renewing, it should be done in the very best manner, and the original standards maintained.

Since this subject has been given to me, I had the good fortune to accompany a number of railroad officials out to Pennsylvania, and we witnessed a trial on the P., B. & L. E. road, which was a revelation to most of us. The Superintendent told us that the average load per car was 105,000 lbs. They also have the heaviest engine, weighing 250,000 lbs., with 225,000 on the drivers, boiler carries 220 lbs. of steam, engine has a drawbar pull of about 50,000 lbs. The trial was with this engine, and 40 cars, and to see if the train could be parted. First trial, hand-brake set on rear of train, engine backing on

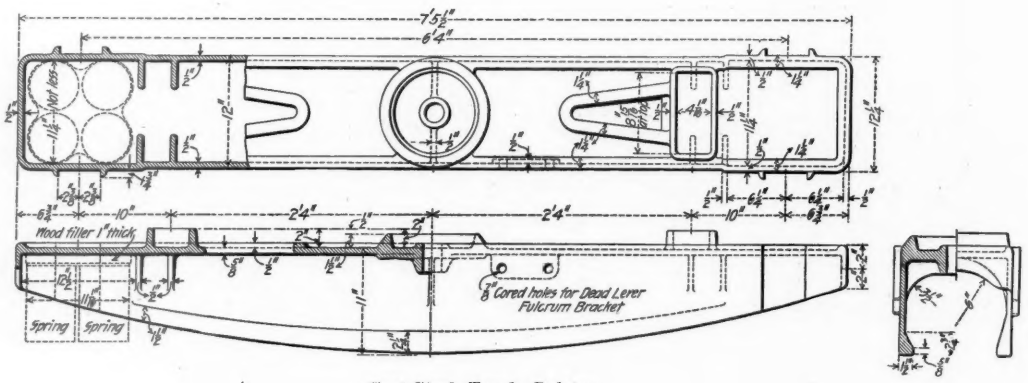




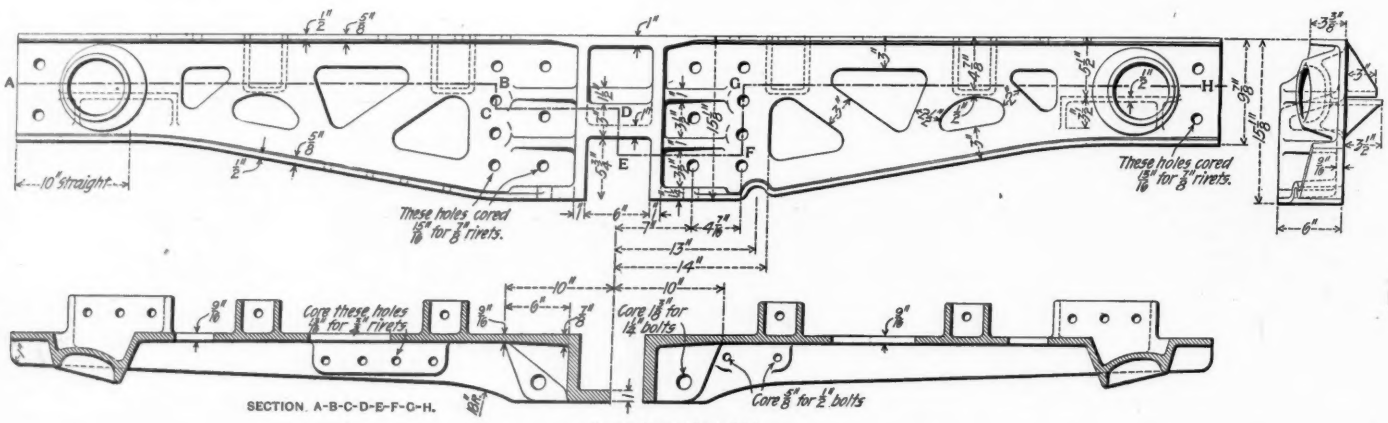
Cast-Steel Body Bolster.



Truck-Frame Details.



Cast-Steel Truck Bolster.



Cast-Steel End Sill.

Details of 45-Ton Box Car With Structural Steel Underframe.

sanded rail, and to get all slack, then opened throttle wide. Train did not part. Next, cars were all charged with air, and the brake cut out on engine and 20 head cars, train backed up a mile or more to get a run, and when going ahead at about 15 miles per hour, and engine working steam, the emergency application was sprung on the rear car, but the train did not part, and when we consider that the brake was not in operation on only the 20 rear cars, the result was remarkable. The next trial we were all invited to ride on the train, but as these cars are all of the double hopper bottom type, the only place to ride was on the end sill, and there we placed ourselves, hanging on to top of car, and when a speed of 12 to 15 miles per hour was obtained the emergency was sprung from the engine this time, and no severe shock was experienced. I will say in explanation that this train had friction draft gear freight cars, and the engine also had friction draft gear.

Mr. E. G. Desoe, Air-Brake Inspector B. & A.—In regard to the per cent. of air-brake cars in trains on the Boston & Albany, I think it averages about two-thirds in through trains, and one-third in local trains. We switch out all air-brake cars, and place them on the head end in through trains, and in local trains enough so that there will be at least one-third of the cars in the train air-brakes on the head end, so as to insure the control of the train by air-brakes. We make no attempt to separate the loaded and empty cars in a train.

Referring to the difference in braking power, on account of having loaded cars at the rear and empties at the head end of a train, causing the train to break apart when the brake was used, I will say that no case has come to my knowledge where a train has been broken apart on this account, when the brake was applied in the usual way (service application), but have known of cases where trains have parted when brake was applied in the emergency from the engine, and I could not account for it in any other way except that it was due to the difference in braking power on the train.

In regard to slid flat wheels the per cent. of slid flat wheels during the winter months is very much in excess of that in the summer. There is no question about this, and I think all railroad companies acknowledge it. This, I think, is due to several causes: first, perhaps on account of the condition of the rail, for the wheels are more liable to slide on a wet greasy rail, and we have more of this kind of a rail in the winter months than in the summer; second, on account of the shoes freezing to the wheel. These two conditions cause a good many slid flat wheels, but from my experience I believe there are more wheels slid flat by hand brakes being left set on a car and then that car pulled for miles on the road with the wheels held from turning by the brake. This, of course, is due entirely to the negligence of the trainmen in not seeing that the brakes are off as they should be, when taking on a car from a siding or out of a yard.

I have had quite a number of cases where wheels were skidded on account of the triple valve not operating so as to cause the release of the brake, but in each of these that I have investigated I have found it was due to the foul condition of the triple.

Mr. Nellis, Westinghouse Air-Brake Co.—I believe that freight train break-in-twos are more often caused by differential piston travel and the use of any and all kinds of brake-shoes. In either of these instances, there is a pulling apart and jamming together of cars, throughout the entire train, which throws great stresses on the couplings. I have also observed that the majority of slid flat wheels on freight cars is due to other causes than dirty triple valves and improper leverage and foundation brake gear. I have often noticed in freight yards where the hand-brake has been left set on a freight car, and the car in being switched it is dragged through the yard with the hand-brake set and wheels sliding. There are also a number of passenger car wheels slid in this same way, although they are fewer. I have observed that flat wheels on passenger cars occur more frequently in short trains than in long trains; and after a long term of observation of these facts, I have concluded, from investigations made, that the flat wheels are caused by poor engine brakes, which shirk their work and throw the extra work of holding on the cars.

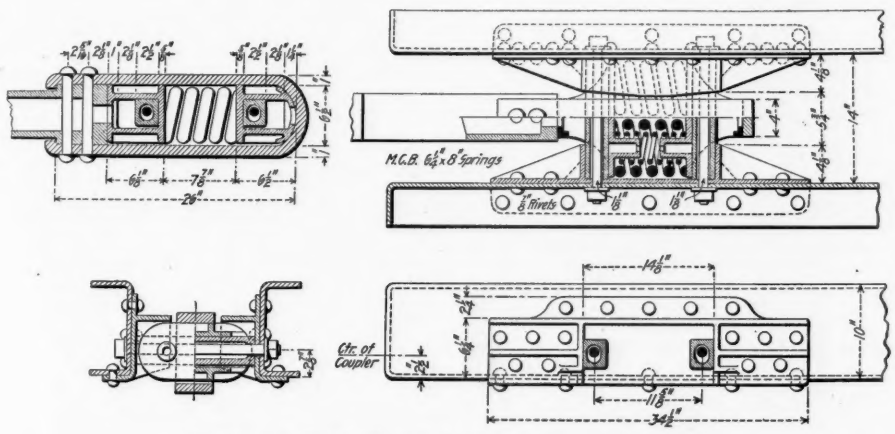
Down in our New York section, we have had some little trouble during the fall and winter months with slid flat wheels on passenger trains, but have overcome them in nearly every instance by greater caution on the part of the engineer in applying his brakes. The usual method is to reduce four or five pounds in making an initial reduction. We have changed this to an initial reduction of about 8 or 10 lbs., thereby getting the greater braking force when the train is at higher speeds, and finishing the stop, when the liability of wheel sliding is greater, with a lower pressure. I believe if more attention were given to the matter of uniform piston travel and brake-shoes which shall furnish a good retarding power, that break-in-twos and slid flat wheels would be very greatly reduced and be nearly eliminated.

I believe that break-in-twos and slid flat wheels have been reduced in number by the switching ahead and coupling up of all air-braked cars. The air-brake certainly has increased the earning power of railroad companies' cars, in that more freight has been handled and trains run at a higher rate of speed. On the New Haven road, right here in your own district, they are switching ahead and coupling up all of their air-braked cars in their trains. They have one train which I understand is all air-braked, and makes its run between New York and Boston at passenger train speed in about seven hours.

Dayton Draft Rigging for Pressed Steel Sills.

The accompanying engraving shows the Dayton draft rigging as applied to pressed steel center sills of cars of from 80,000 to 100,000 lbs. capacity. In this design a heavily ribbed malleable iron sill plate is used which is attached to the sill by 20 rivets, ⅞ in. in diam. This plate has a flange on its lower side which extends beneath the lower flange of the center sill, these flanges being riveted together. The sill plate is very stiff and is designed to prevent buckling of the center sills; also it distributes the strains over a large area of the sill.

The stop bars and followers used with this rigging are the same as those applied to all the different types of the Dayton rigging. The stop bars are carried by 1⅛-in. bolts which pass through their centers and also through the sill plates and center sills, tying the sills together at the point where there are the greatest strains. The tail strap has a rounded rear end, and it is expected that this construction, in which sharp corners are avoided in the yoke, will overcome the breakage of straps in the corners. Where the rigging is applied to rolled steel sills the same patterns of sill plates are used excepting that the flange which engages the lower flange of the center sill is left off, as it is not deemed necessary with the rolled sections.



The Dayton Draft Rigging Applied to Pressed Steel Sills.

The Dayton Malleable Iron Co., Dayton, Ohio, in furnishing this rigging supplies four sill plates per car, four stop bars and four followers, all of malleable iron. This is the complete rigging excepting springs, tail straps, bolts and rivets.

Some Changes in New England Railroads.*

. . . In 1829 the Board of Directors for Internal Improvements for the State of Massachusetts caused surveys and estimates to be made for a railroad from Boston to Albany. In their report to the Legislature recommending that the state build such a road, they estimate the yearly traffic at an equivalent to 46,950 through passengers and 133,500 tons of local and through freight, with a probable future increase in proportion to the growth of population and industries on the line of the road. They qualify this estimate, however, by adding that "these amounts are not assumed with confidence and it would perhaps be safe to assume a much lower amount." In 1899 the Boston & Albany Railroad, built on substantially the line recommended by the Board, carried 10,087,380 passengers and hauled 4,847,000 tons of freight. . . .

Their ideas of motive power are worth quoting; they say that, "In England and France the steam locomotive, which has been brought to a high degree of perfection, is used successfully, but owing to the higher cost of coal and lesser cost of oats and other food for horses, the horse is preferable for this country." With this further information, "The labor of the horse may be relieved by providing a platform placed on small wheels, on the long descents on which the horse himself may ride. This expedient, singular as it may seem to persons unaccustomed to observe the ease of loco motion on a railroad, is adopted with success and the horses eat their provender while they are returning to a point where their labor is to be resumed." This report has further interest in that it covers surveys made at that time for three different routes for a railroad from Boston to the Hudson River, designated as the Northern, Middle and Southern, all of which were declared feasible, but preference being given to the Southerly or present Boston & Albany Line. The other routes are to-day covered by the lines of the Fitchburg and Central Massachusetts railroads, with little deviation from the original surveys. . . .

In 1871 the railroads in Massachusetts received an average rate of 2.51 cents per passenger and 3.11 cents per ton of freight for each mile carried. In 1899 they received for an immeasurably better service 1.77 cents per passenger and 1.18 cents per ton for freight; a decrease of 30 per cent. in the passenger rate and 62 per cent. in the freight rate.

The Massachusetts railroads earned in 1899 $75,430,000 and paid dividends amounting to $12,143,749. Had they received the 1871 rate for the traffic handled they would have earned an additional $74,683,000, all of which would have been net earnings. . . . The earnings of the railroads in 1871 were not excessive and their physical condition from the standpoint of to-day was poor. How this problem has been met and successfully solved is a subject for profitable study and one in which, so it seems to me, the engineer should find especial interest, the craft having borne an important part in its solution. In the past is a lesson for the future, for the end is not yet.

It is true that natural conditions have lessened the cost of operation, but these have been far from keeping pace with the declining rates. Salaries and wages, which constitute 60 per cent. of the cost of operations, have not been reduced, an important fact and which should stand to the credit of railroad management. Material and supplies, including fuel and rails, two important items, cost less in 1899 than in 1871. Interest charges, in common with money rates in other lines of business, have fallen. Natural increase in volume of traffic may also be credited with a considerable saving in the cost of transportation, it being true as regards railroads as well as manufacturing plants that the cost of operation per unit of output decreases in proportion as the maximum capacity of the plant is reached. . . .

The number of operating roads in Massachusetts has fallen from 36 in 1871 to 11 in 1899, and of the 11 remaining in 1899, four operated 97 per cent. of the mileage and handled 99 per cent. of the traffic. Of the New England systems the Boston & Maine probably covers more distinct roads than any other. It is difficult to trace the exact identity of each part of the system, but I think it safe to say that the Company operates roads constructed under as many as 100 different charters and of which 50 or more were at some time in their history operated as independent and full-fledged railroads. . . .

The Boston & Albany Railroad is a splendid example of what has been done in this line [costly improvements]. It has spent millions of dollars in permanent improvements, persistently following a broad and far-sighted policy until with its splendid roadbed, its two and four tracks of the heaviest steel, steel bridges and solid masonry, elegant and substantial stations, with lawns and shrubbery, its absence of grade crossings and the general excellence of its rolling stock and other equipment, it stands as a monument to the wisdom of its managers. This road has had to meet the common reduction in rates and strongest competition, yet it has regularly made handsome returns to its owners.

The elimination of grade crossings has been a costly and important work on all roads, but, contrary to a common impression, it cannot be credited with reducing the cost of transportation as in most cases a moderate interest on the expenditure is much in excess of the cost of protection by watchmen, with an ample margin to cover liability for accidents. This has been a work of safety and public convenience, not of economy.

The capital stock of the Boston & Providence Railroad, now operated by the N. Y., N. H. & H. R. R. Company, is four million dollars. During the past five years more than that sum has been expended on the property in abolishing grade crossing and in other improvements within the city limits of Boston.

Further brief mention of this particular grade crossing work may be of interest as it was of great magnitude and done under conditions calling for the exercise of high engineering skill and extraordinary care in the movement of traffic.

From Massachusetts avenue, in the city proper, to Washington street, Forest Hills, a three-track railroad crossed at grade 11 important streets. Over these crossings 100,000 passengers, 12,000 teams and more than 200 trains passed daily. At Forest Hills a junction was formed with a two-track branch extending to Dedham, the switches and signals being operated by a modern interlocking plant with another similar plant controlling the switches and signals at the entrance of the roundhouses, shops and yards at Massachusetts avenue. On this same location was constructed a four-track road of entirely new material carried over all streets on steel

*Extracts from an address by Mr. C. A. McAlpin, Division Superintendent New York, New Haven & Hartford R. R., before the Harvard Engineering School.

arch and girder bridges, provision being made for two additional street crossings, and the Metropolitan parkway at Forest Hills, the tracks being carried over the latter on a series of granite skew arches. One street which formerly crossed the railroad by an overhead bridge was lowered to the original grade of the tracks. This work included the building of eight new and raising two old passenger stations and building two new freight yards. The channel of Stony Brook was changed at a cost of about $200,000 and $84,000 was expended for temporary trestles in order that traffic might not be delayed; 135,000 yds. of masonry and 1,200,000 yds. of earth filling cost $1,412,000. The switch and signal systems were changed and enlarged to meet the new conditions and kept in continual service during the progress of the work with interruptions of no more than a few hours.

Two years were required for the work, which was completed at a total cost of about $3,500,000, and was accomplished without any delay or disturbance whatever to the regular traffic of the road, which had in the meantime increased to about 250 daily trains, and with a single insignificant exception, without injury to train or passenger. . . .

The various features of maintenance and operation have been specialized and grouped under supervising officers qualified by ability and experience to obtain the best results in their particular departments.

A good example of the changes in this direction is seen in the old and new methods of handling freight car equipment. Formerly this was done under the general direction of the superintendent or some other officer having supervision over various other branches of the service, and who consequently could devote but a small portion of his time and attention to each. Usually, but not always, deliveries to and receipts from other roads were checked and at the end of the year an attempt was made to locate and secure the return of overdue cars. Beyond this there was little systematic supervision over the movements. Station agents and yardmasters arranged with one another and with freight train conductors for needed cars as best they could. The result was a vast amount of unnecessary empty car mileage, needlessly idle cars, cars wrongly loaded and improperly used. A station agent having an empty car and anticipating a load for it a week hence would not send it away and risk the uncertainty of getting another when needed, but would allow it to remain idle until the load was ready, or, having an empty foreign car, would load it for a destination away from its route home, thus adding to empty car mileage or necessitating an expensive transfer of the load.

To-day the car accountant with jurisdiction over hundreds of miles of territory, and whose office is connected by wire with practically every station within his territory, controls the distribution and movements of every car, both home and foreign. At the close of the business day each station makes a detailed report to the car accountant covering all equipment at the station. At a fixed hour daily, or oftener, a telegraphic report is also made; this report is in cipher and gives in a concise form the number and description of each class of cars on hand, number to spare and number required for business in sight. These reports are quickly assembled in the car accountant's office in a manner to show at a glance the needs of the service, equipment available and most economical and expeditious manner of meeting the requirements. This has resulted in an enormous increase in the earning capacity of the freight car with a decrease in the cost of movement and better service to patrons. . . .

The service does not offer an easy road to positions of prominence; it has no place for the indolent or incompetent, but to the energetic and capable, who are willing to comply to its exacting conditions, it promises opportunities for advancement according to ability. While it calls for abilities of a high order there is perhaps nowhere a wider scope for their exercise. To successfully conduct the affairs of a railroad one should not only have a practical knowledge of the details of the business, gained from experience, but should have executive ability and a thorough knowledge of men as the human element is a most important factor in the problem. He must be able to select competent and trustworthy lieutenants, command the loyalty of his subordinates, while maintaining strict discipline and dealing justly by all. He must keep in close touch with the people and interests of his territory in order that the public may be best served and that he may best meet the ever-changing conditions.

The greater number of our successful railroad managers of the past have had but little beyond a practical education gained in the service and the value of which cannot be overestimated, but changing conditions are making it more and more necessary that he have in addition a technical training, that he may the more readily recognize and avail himself of correct scientific principles.

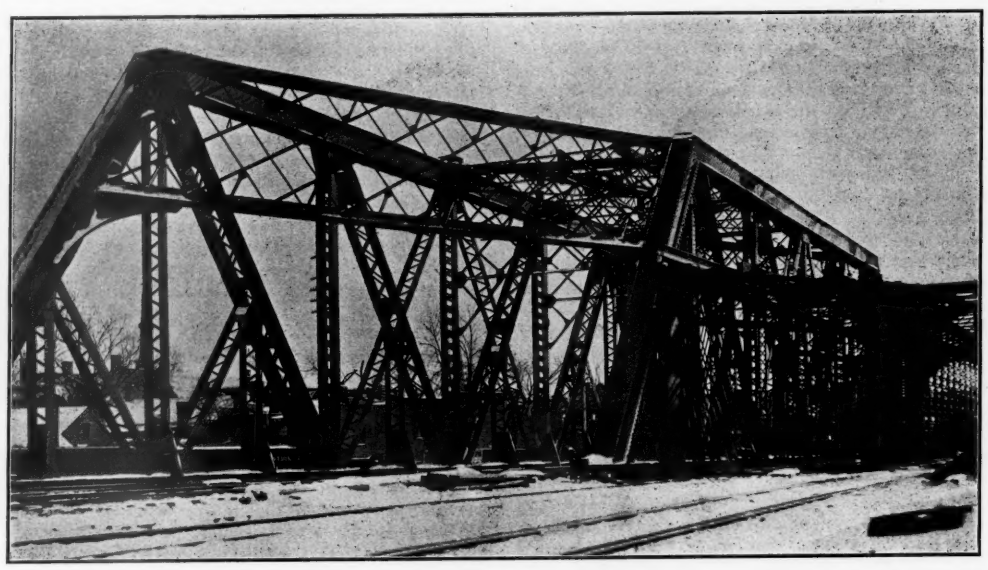
In my opinion the time is not far distant when the railroad man who has not the advantage of a university education or its equivalent must fall to the rear unless gifted with exceptional natural abilities, and all else being equal the engineer will take preference in pushing to the front. Each year the engineer takes a more prominent place in railroad management, it being recognized that successful operation is largely dependent on proper construction.

The Engineering Department of the New York Central.

In our issue of March 8 appeared an article under the above title giving a general review of the present organization of the civil engineering department of the New York Central & Hudson River Railroad and also some details of recent work of improvement of grade and line. Since that date we have published a number of articles descriptive of various engineering works on the New York Central, especially describing some of the new drawbridges, the West Albany shop improvements and some of the new interlocking work. We now resume the more general articles, dealing with bridges, track elevation, water supply, etc.

III.—BRIDGES.

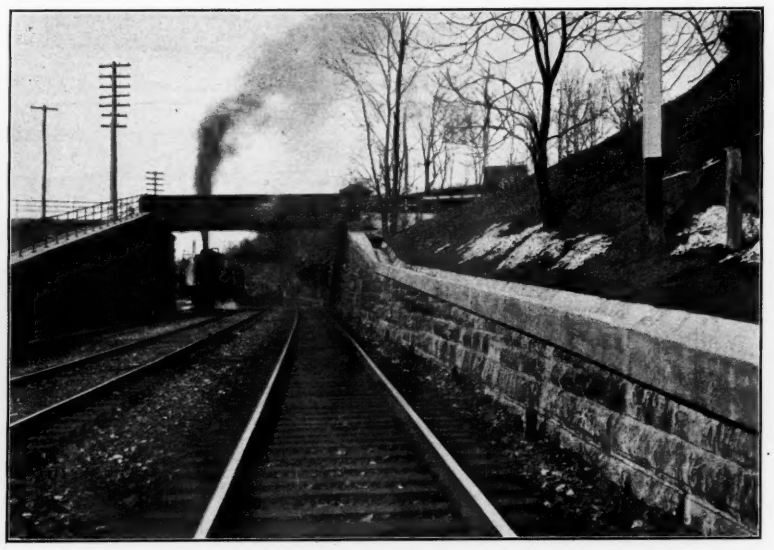
Owing to the great increases in the weight of locomotives and rolling stock the company has thought it wise to rebuild its bridges and at the same time to make necessary radical renewals and repairs of masonry so as to place all bridges in thoroughly first-class condition. This has involved, in addition to a large amount of masonry work, the renewal of 385 bridges, including 756 spans,



Old and New Bridges, New York Central & Hudson River, at Schenectady.

New Bridge, Tracks 3 and 4. *Old Bridge, Tracks 1 and 2.*

Concrete Abutments for Plate Girder Bridge Near Peekskill.



Concrete Coping and Water Ditch at Dobbs Ferry.

TABLE SHOWING INCREASE OF WEIGHTS OF LOCOMOTIVES.

Year.	Class.	Type.	Total weight on drivers.	Total weight of engines.	Maximum weight per pair drivers.	Locomotives and tenders, loaded, tons.
		Passenger Engines.				
1870.....	A	8-wheel	55,000 lbs.	88,000 lbs.	27,500 lbs.	75.1
1886.....	A-1	8 "	58,000 "	90,000 "	29,000 "	79.3
1888.....	A-1X	8 "	65,500 "	98,500 "	32,750 "	84.6
1890.....	I	8 "	80,000 "	120,000 "	40,000 "	100.0
1896.....	I-I	8 "	90,100 "	134,600 "	45,050 "	114.1
1899.....	Q	8 "	128,900 "	168,900 "	42,967 "	135.5
1900.....	Q-1	8 "	134,200 "	175,000 "	46,770 "	143.5
1900.....	I-4	8 "	95,000 "	171,000 "	47,500 "	141.5
		Freight Engines.				
1870 to 1878.....	Light 17 x 24	8-wheel	47,000 lbs.	76,000 lbs.	23,500 lbs.	69.0
1879 to 1883.....	B	8 "	52,225 "	79,800 "	26,110 "	72.1
1886.....	B	8 "	54,900 "	85,800 "	27,450 "	75.2
1888.....	C	10 "	80,500 "	105,100 "	40,250 "	84.5
1889.....		Mogul	104,500 "	120,000 "	34,830 "	96.0
1898.....	P	"	131,600 "	152,000 "	43,867 "	124.4
1899 and 1900....	P-15	"	137,850 "	160,550 "	45,950 "	134.3
1901.....	Consolidation		160,000 "	180,000 "	40,000 "	145.0

aggregating in length 118,000 lineal ft. of single track, and weighing 64,237 tons. Of this total amount 44 double-track bridges and 124 four-track bridges, weighing approximately 33,708 tons, are between New York and Buffalo.

The rebuilding of these bridges, particularly between New York and Buffalo, has called for a departure from usual methods owing to the complicated character of the numerous skew crossings of canals, highways and railroads and to the very heavy traffic which must necessarily be maintained during the erection of the bridges. Many of these over the Erie Canal have been erected without the aid of falsework, so as not to interefere with navigation.

The accompanying statement of the steady increase in the weights of locomotives since the old bridges were built, 1868-1872, will be of interest.

The standard types of bridges are:

Spans up to 14 ft.: Concrete-filled rail culvert cover.

Spans up to 25 ft.: Plate and I-beam floors.

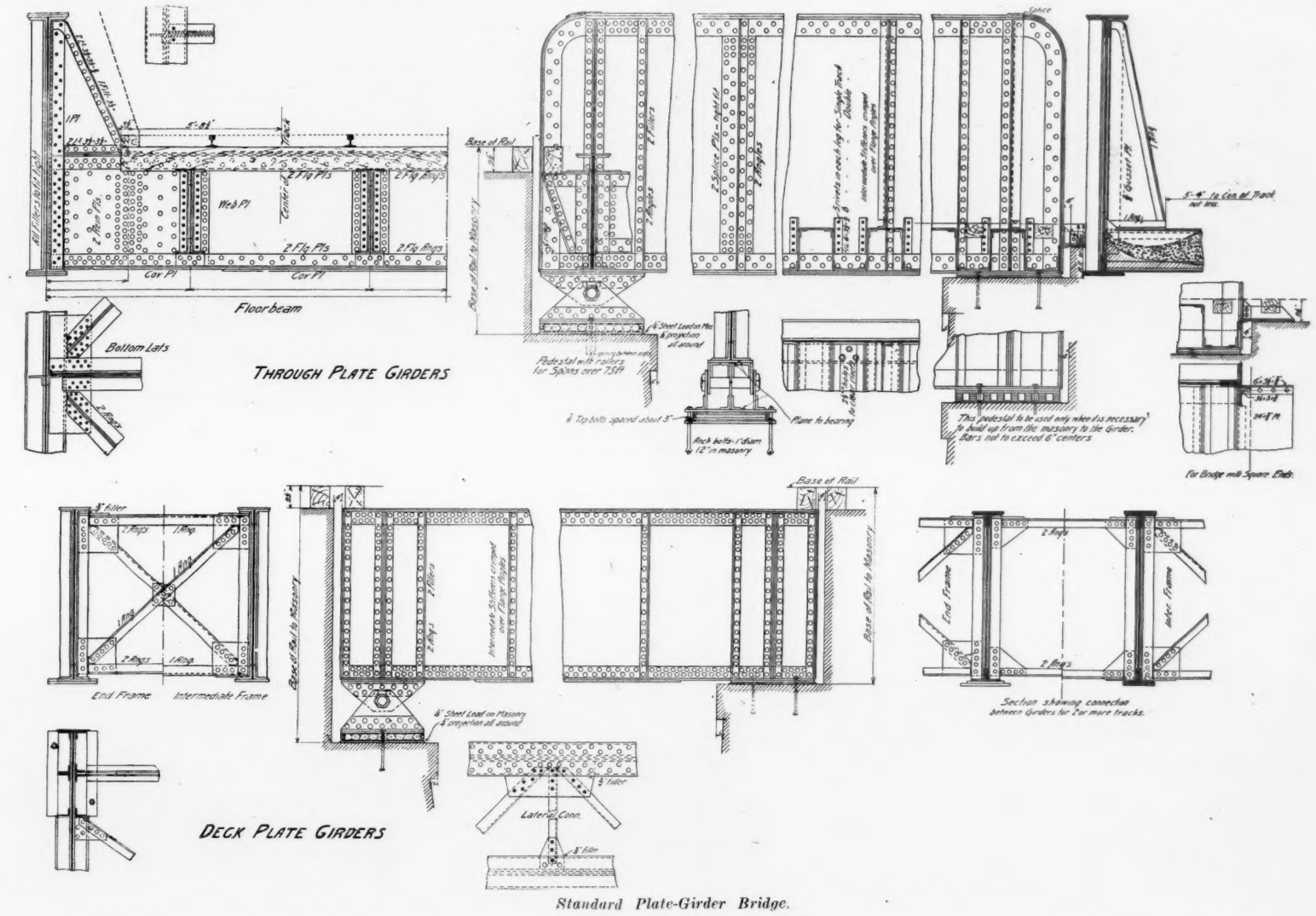
Spans 25 ft. to 100 ft.: Plate girders, through and deck.

Spans 100 ft. to 200 ft.: Riveted lattice trusses.

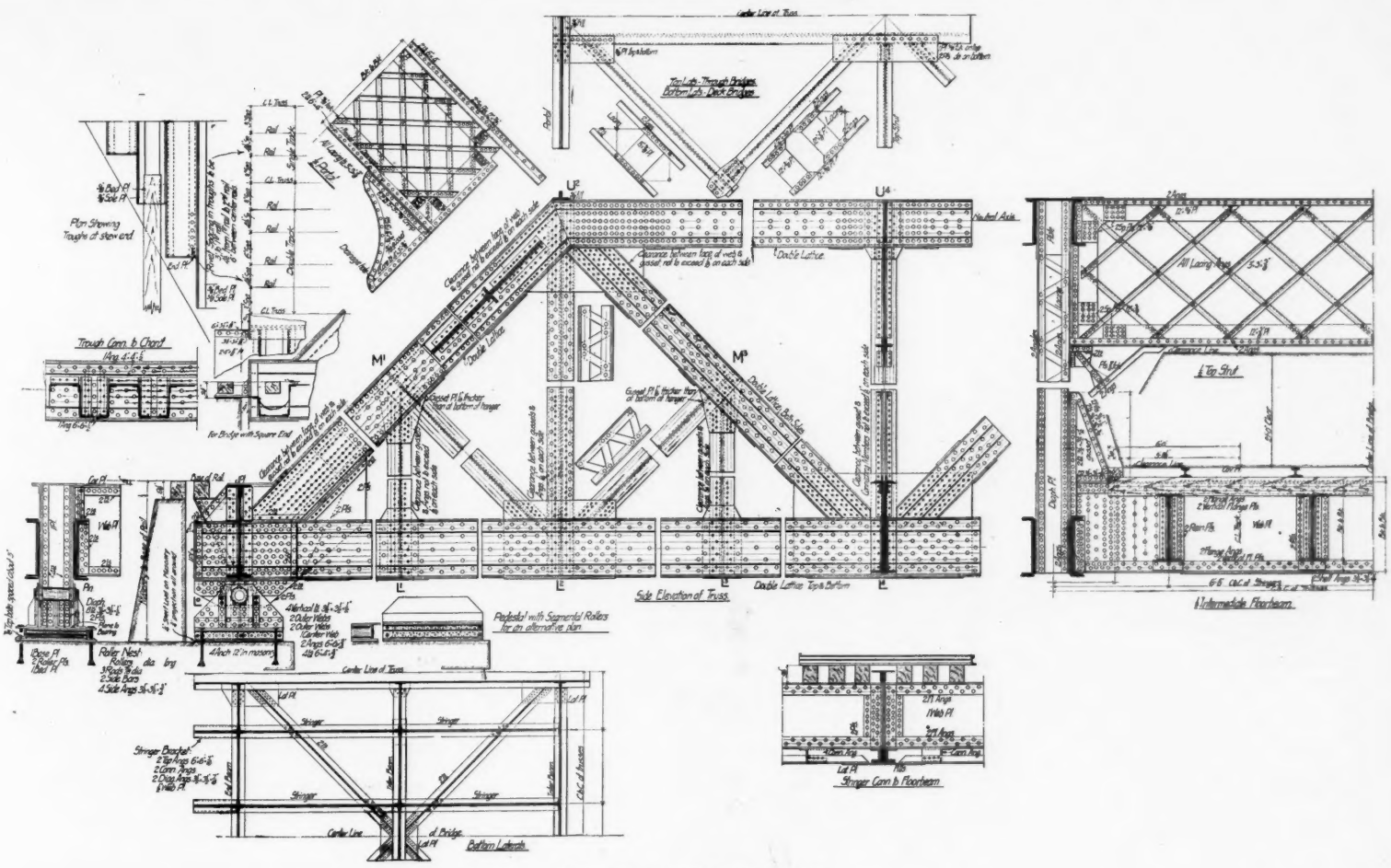
Spans 200 ft. and more: Pin-connected trusses.

The details of the I-beam bridges are shown in the drawings. Under the gravel ballast, the plate is covered with a "binder," composed of clean ¼-in. gravel and No. 4 asphalt paving composition in the proportion of 1 cu. ft. of gravel to 1½ gals. of paving composition. The gravel is heated to 300 deg. Fahrenheit and the whole thoroughly mixed at that temperature and shaped to the bottom and sides of the trough as shown in the drawing.

In all bridges the live load is assumed to be two consolidation engines (160,000 lbs. on drivers) coupled, and followed or preceded by a uniform train load of 4,500 lbs. per lineal ft. of track; or of 120,000 lbs. equally dis-



Standard Plate-Girder Bridge.



Standard Riveted-Truss Bridge.

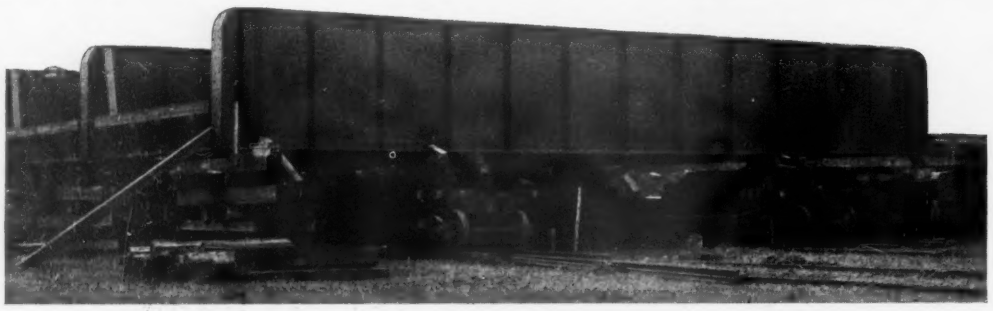
Some New York Central & Hudson River Railroad Bridge Standards.

tributed on two pairs of driving axles, spaced 7 ft., followed by a train load 4,500 lbs. per ft.

The bridges are built entirely of steel and the specifications call for the best grade of open-hearth steel, of uniform quality, tough and ductile, to contain not more than .08 per cent. phosphorous for acid, or not more than .04 per cent. phosphorous for basic open-hearth steel, and not more than .05 per cent. sulphur. The work has been divided among the principal bridge companies of the United States, and the railroad company has maintained rigid inspection at each shop and mill.

Sliding into place the four-track bridges on the Mohawk and Western divisions has been an interesting operation. During last fall, all along the line these grim-looking structures could be seen from the car window, lying parallel with the track on the edge of the right of way, waiting for place. They were mounted, as shown in the photograph, on trucks running on temporary tracks, running at right angles to the line, through the track openings. The record of substitution of Bridge No. 450, over East Creek, near Little Falls is typical. It had four tracks, three through plate girders, and weighed 220 tons. Tracks were laid under both the new and the old bridge and by the use of trucks both structures were moved so that the new one was placed in permanent position within less than an hour after the last passenger train passed over the old bridge. The record was as follows:

The last train over tracks 1 and 2 passed over the old bridge at 8:30. The engine pulling the bridge followed the last passenger train on track No. 1 at 8:35. All tracks were pulled up and the bridge started to roll into place at 8:44, and it was in its new position and in proper line at 8:50. It was jacked down into place on the masonry at 8:58, or 14 minutes after pulling was started. Tracks were re-laid and track No. 2 was ready for service at 9:15, and the first regular train passed over the bridge at 9:39.



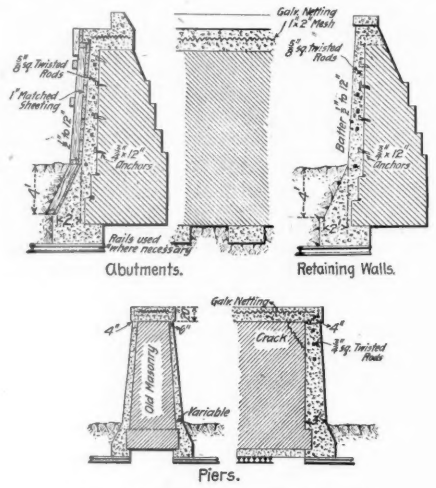
Running in a Four-Track Plate-Girder Bridge.

IV.—THE ROCHESTER RECONSTRUCTION.

The elevation of the tracks in the City of Rochester was completed in 1883 and covered the territory from King street easterly to Scio street, a distance of about 1.6 miles. This improvement provided for from 4 to 12 tracks and involved the crossing of 18 streets, the Genesee River, Erie Canal, and several mill races, and the construction of high retaining walls along certain streets and alleys. The masonry consists of limestone laid in natural rock cement and founded on firm clay and solid rock with base thicknesses of from four-tenths to one-third the height. The embankment filling was made with a fine sand.

For several years the walls, abutments and piers have shown marked indications of failure due to the insufficient thickness and poor cement, and as the superstructures required entire renewal owing to the increase in weights of motive power and rolling stock it was decided to undertake radical repairs. The extremely heavy traffic and the proximity of the work to the streets made it practically impossible to tear down and rebuild the masonry and therefore it was deemed wise to treat the masonry by underpinning and facing it with concrete and to reconstruct bridge seats and copings with concrete and Roebling netting.

The City of Rochester granted permission to the Railroad Company to extend the facing within the street lines for distances varying from 6 in. to 22 in. at the sidewalk level, with wider projections under the street surfaces. The resulting advantages to the city were the improved appearance of the walls, smooth surfaces, the removal of columns at several of the street crossings, and the construction of tight floors at the overhead superstructures which prevented drippings of water and grease.



Repairing Masonry With Concrete.

The underpinning was usually carried 18 in. below the masonry footings and for the same distance beneath them so as to increase the bearings. The underpinnings projected 2 ft. in front of the footings, battering to the required thicknesses of from 6 in. to 22 in. at the sidewalk level. The underpinnings were laid in alternate sections. After the first sections had thoroughly set the intermediate sections were excavated and the underpinning completed without disturbing the wall.

Where the casing extended above the sidewalk level the masonry joints were first thoroughly raked out to the depth of 1 in. and holes were drilled on a slight angle one for each 20 sq. ft., for receiving the anchors of ¾-in. x 12-in. square iron with bent ends. These anchors were given a driving fit and set in neat Portland cement. Longitudinal ⅝-in. and ¾-in. twisted square rods were liberally used, spaced about 2 ft. apart vertically to prevent cracking of the facing from unequal contraction and expansion or settlement, and especial care was taken in their use at corners and angles.

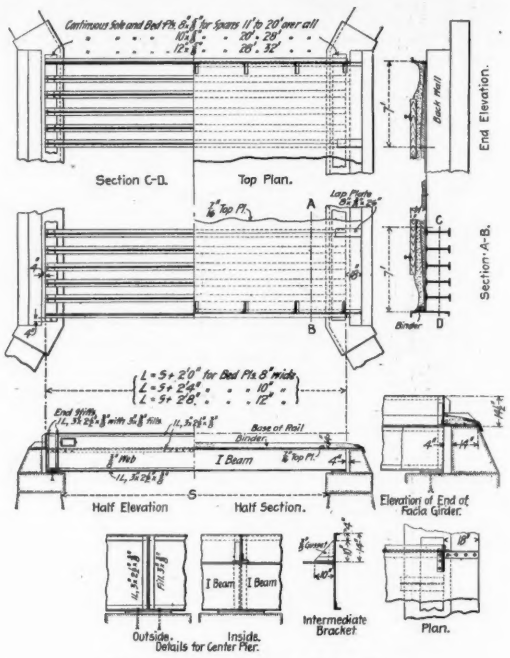
The forms consisted of 1-in. sheathing on 2-in. x 4-in. plates, sills and studs, fastened to the wall anchors by wire ties.

The bridge seats are built not less than 20 in. in thickness, tied together by No. 8 galvanized Roebling wire netting, and where heavy weights are concentrated, railroad rails and "I" beams are used to distribute the pressure.

At places where work was unavoidably interrupted so that the concrete became "set," track spikes were placed in the green concrete with projecting heads, one for each 4 sq. ft., and when the work was again started the old surfaces were thoroughly cleaned and washed with neat Portland cement.

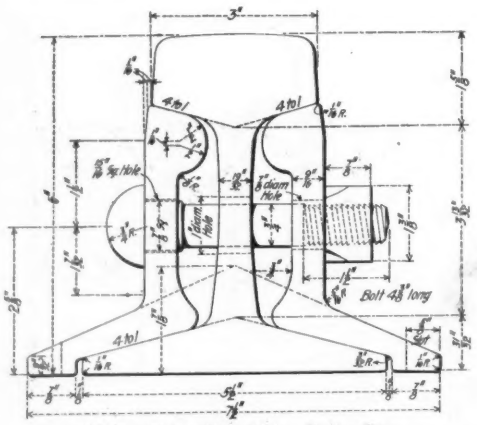
The entire work embraced the underpinning and encasing of the abutments of 14 bridges and 8 piers; the widening of the foundations and rebuilding of bridge seats of five bridges; the underpinning and encasing of 800 ft. of retaining wall; the tearing down and rebuilding with masonry of the upper portions of 1,250 ft. of retaining wall, and the construction of 135 new column foundations.

The new superstructures aggregating 6,520 tons in weight include 50 spans, of which 40 have solid floors.

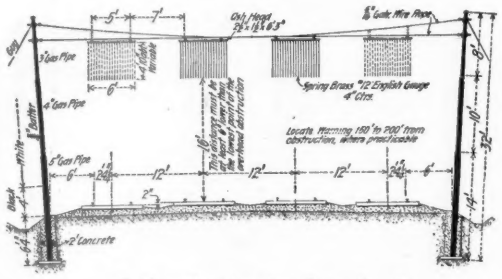


Standard I-Beam and Plate Floors.

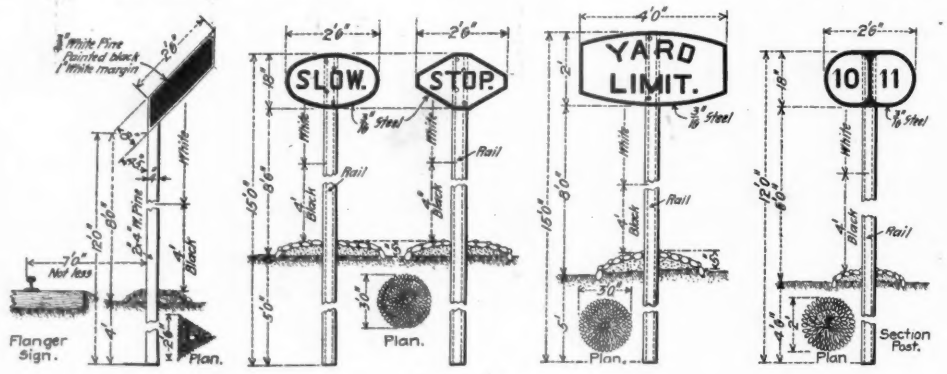
New York Central Minor Bridge Practice.



100-lb. Rail With 36-in. Splice-Bar.



Bridge-Warning for Four Tracks.



Track Signs.

Some Other Standard Practice.

Track Circuits.*

Nearly all modern installations of automatic block signals are made with track circuits; and too little regard is given to this important feature. In making plans the Engineer is too apt to confine himself closely to a map of the tracks, and not take into consideration the kinds of ballast and the condition of the ties and rails. As a rule in wet weather there is more or less leakage of current from one rail to the other with all kinds of ballast. Dirt is the poorest of all, and next come cinders, burnt clay, gravel and crushed stone. With dirt it is usually necessary to make the track circuits short, but with stone it is possible to make them of mile lengths, when using proper relays, unless there are a large number of switches in the circuit. No matter how carefully a switch is insulated and wired around, there is liable to be more or less resistance and leakage in the circuit there, but, using the ordinary gravity track battery, there should never be a drop in voltage greater than one-tenth.

Ordinary dry cedar and oak ties are better insulators than ties treated by the chloride of zinc and tannin process. These latter seem to cause a leakage about 5 per cent. greater than with the former. As oxide of iron is a good insulator there will be less leakage of current, due to contact with the ballast, in a circuit where there are old rails than where the rails are new. Perfection has not yet been reached in insulating joints; the old wooden type of joint is probably still as good as any. The commercial fibers do not stand moisture as they ought, and the resistance of a joint containing fiber will

*A paper by A. G. Shaver, Assistant Engineer Union Pacific, read before the Railway Signaling Club, Chicago, May 14.

drop from the neighborhood of 1,000 ohms, when first put in to an average of 8 to 10 ohms after having been in use and exposed to the weather for a time. It seems to be penetrated and disintegrated by moisture and does not appear to ever dry out, even in the dryest weather. In my experience, as many as nine-tenths of the signal failures in automatic signaling have been due to the track equipment, and a goodly portion have been the fault of the insulation.

Again considering the length of the track circuit, the resistance from rail to rail should never in any case be less than that of the relay in that circuit, and, inasmuch as this resistance decreases directly in proportion to the length of track in circuit, it would seem to be necessary, in increasing this length, to decrease the resistance of the relay in the same proportion in order to get the same amount of current through the coils.

A certain magneto-motive force is required to operate the armature of a relay, and as this is directly dependent upon the number of ampere-turns in the coils, it would be necessary in order to keep this quantity constant in decreasing the resistance of the windings, to change the quantity of iron in the cores and to increase the size of the wire used. But all this is troublesome and cannot well be carried out in practice. The custom universally appears to be to make use of a relay of practicable size and adapt it if possible to track circuits of convenient length.

The smallest practicable unit of electrical energy, the gravity battery, is in use in track circuits almost everywhere, but the biggest portion of its output is not utilized in the relay, and the question is, cannot some of this wasted energy be made use of and better results be obtained by proper care being taken in installing the track circuits and in determining upon a form of relay having such a relation between magnet cores and core windings, that its range of usefulness will be larger than with those at present in the market?

Out-of-Order Indicator for Automatic Signals.*

Considerable dissatisfaction having arisen with the ordinary way of showing that a block signal was out of service, by hanging a green disk over the number (which was liable to be blown off), tying on any old piece of gunny sack, Walter Gravit, Assistant Master Carpenter at Elkhart, devised a small fish-tail blade so attached as to hide the number and permit the use of the regular single lamp to give a corresponding *night* indication. Later this was shifted to stand full in front of the regular signal disk, so that there should be no change in the location of the indication; also the number was left exposed, enabling the engineer to see it.

Temporary Caution Signal, L. S. & M. S. Railway.

The blade with its glass and bracket is all one piece and can be easily placed in the small socket (shown in cut) which is permanently placed on each signal. Each maintainer is supplied with one or more of these blades. He can easily take along one when going to a signal that has been reported defective. Should his territory be large it could be kept in the section house nearest to the signal, and the section foreman be instructed to apply it as soon as the signal went wrong.

The cost of these indicators complete is about $4.75 each. The cut shows one on an enclosed disk. The same arrangement is used with clock-work disks.

*Abstract of a paper by E. D. Wileman, Signal Engineer, Lake Shore & Michigan Southern; read before the Railway Signaling Club, May 14.

The Air-Brake Association.

(*Concluded from page 315.*)

Unconnected Hose Versus a Dummy Coupling.—(Committee: H. H. Forney, H. C. Fraser, J. Dickson and T. A. Hendendahl.)

The importance of keeping the air-brake system clean is a matter which has impressed itself upon all who have studied the subject. A variety of opinions have been advanced as to how this should be accomplished, and quite a few suggestions have been put into practice, with varying results.

The design of the old "coupling hook" is too well known to require any explanation. It was thought at the time that it would not only exclude the foreign matter from entering the hose and train line, but would also provide protection to the hose from the evil effects of swinging, and hold the couplings up so as to prevent them being battered up and broken by striking switch frogs, switch rails, etc. In this connection it should be remembered that there was more danger of couplings coming in contact with rails and ballast in the days of the old drawbar, when it was necessary to use a 24-in. hose, than at the present time with the M. C. B. coupler, where a 22-in. hose is used. So that there has been a probable reduction in the number of battered and broken hose couplings due to this reason. While it must be conceded that the old "coupling hook" was defective in both design and application, a careful analysis of the entire subject, however, would lead to the belief that it possessed some merit, which, owing to improper manipulation and changed conditions, has very materially affected its usefulness as a protecting device. Yet the underlying principle is a correct one; and it would not seem out of place to ask if it had been given a sufficiently exhaustive trial before being removed by the wholesale stampede inaugurated a few years ago by some members of the M. C. B. Association.

In reference to the old "coupling hook," the conditions then existing were no doubt responsible for the design. The flat plate was intended to close the opening in the hose coupling by having the gasket make a joint against it, thus preventing any dirt passing into the opening, subsequently into the train pipe, and then carried along by the air into the triple valves. The guard finger passed around the cap nut on the back of the hose coupling, clamping it against the plate and making a very secure fastening. Unfortunately, owing to the hard treatment it was subjected to, the guard finger soon became bent, then the gasket would not make a joint, and, standing open, afforded a convenient lodgment for sand, etc., falling into the hose. Unless the precaution of blowing out was observed before coupling up, the accumulation was shot into the train pipe of the next car, eventually lodging in the triple valves and strainers. This was the worst feature of the design. The other defects for which it has been condemned were due to improper usage, such as hanging the hose up by inserting the guard finger under the stop pin, partially turning the face of the hose coupling up, and thereby exposing the entire opening for the admission of foreign matter. Also by hanging the hose up by thrusting the guard finger into the opening, thereby ruining the gasket and causing needless expense and exasperating delays.

As the hook was attached rigidly to the end of the car, in order to avoid kinking the hose it was necessary that a relative proportion between length of train pipe, angle of hose connection, and location of hook be observed, so as to give the hose a natural easy curve, avoiding any undue stress upon any portion of it. This was not always done, and consequently a great many hose were broken as the result of kinking. No definite data has been obtainable as to the number of hose removed on account of being broken from kinking; nor the attendant increase or decrease of the number of triple valves requiring cleaning, due to allowing the hose to hang unprotected; or the condition of the triple valves before and since the removal of the "coupling hook." In view of this lack of data upon these points, the committee has interviewed a number of foremen who have had direct charge of this work for years, and will submit their opinions.

The first man says: "I believe that the number of kinked and broken hose are less now than when the 'coupling hook' was used; but there seems to be more broken and battered hose couplings than formerly. I am confident that the amount of dirt in the triple valves is greater, requiring more frequent cleaning and making greater wear on the mechanism of the valve."

The second man says: "When the old 'coupling hook' was taken off I thought that it was a mistake, and did not hesitate to say so. But now it seems to me to be a question as to whether the decrease in the number of kinked hose does not offset or balance the slightly increased amount of cleaning which the triples require. While I believe that the amount of dirt in the train pipe is some greater than it formerly was, yet it does not seem as if the difference of the kind of dirt in the triple valve has changed much. But there is this much about it, most roads are now about all equipped with air-brakes, so there are not many hose hanging down while on the road, and it is only in switching that the hose gathers dirt by dragging."

A third man says: "I do not think there is much difference in the number of kinked and broken hose, nor a great difference in the amount of triple valve cleaning. The strainers show more loose dirt than they formerly did, and almost everybody will agree that a hose plowing through a pile of front end cinders, scooping them up and shooting them into the train pipe, does not help the triple valve to keep in good order."

A member of this committee who has made a special observation of this matter, reports: "On this road the old 'coupling hook' is still used, and in almost every case where the hose showed indications of kinking from hanging up, the triple valves were not cut. The dirt in it was brown rust from oxidation of the pipes, which dries up the lubrication, but does not cut. Those hose showing unmistakable indications of swinging had quantities of sand in them. In two of the worst cases of cut bushing and packing ring, the hose had to be removed at the same time on account of being cracked clear around the nipple, but no indications of kinking could be found. The strainers were stopped up with dirt and grit. My observation of a passenger train, running through on this line, a distance of about 2,000 miles, on which the hose was purposely left hanging, was that the signal hose coupling was entirely ruined, being battered out of shape, and both openings in the hose were filled up level with the gasket with sand.

"At two of the main inspection points there were 33,750 cars passed in November, 1900, of which 90 per cent. had air-brakes, 684 cars had triple valves cleaned, 66 air hose were removed on account of defects, and 118 gaskets removed. Of the hose removed, 23 were on account of kinking, 24 on account of swinging, and balance for other causes. Of the gaskets removed, 81 were injured by the coupling hook and balance worn out.

"As the 'coupling hook' on this line is fastened rigidly to a bracket it must necessarily be placed rather low, and often gets bent out of shape or knocked off. Then the hose is either out of its natural curve or cannot be hung up. This accounts for the injured gaskets, and injuries to the hose from swinging; but it would seem that if the new style dummy coupler were used and fastened with a chain, low enough to let the hose curve properly, it would prevent at least half the swinging movement, keep out all of the dirt, and not injure the gasket. At present we are having trouble with the hose freezing, and I believe that we have as much trouble with those that are not hung up as with those that are."

Recently a member of the committee examined a number of old hose sent in to the general shop from a mountain inspection point. There were 94 hose in the lot, of which 49 were removed for being spongy, clamp broken, leaking under clamp, etc., 22 broken at nipple on account of swinging, 14 couplings broken and battered, 9 torn off. A comparison of these figures shows 23 per cent. broken account swinging, 15 per cent. broken and battered couplings, 9 per cent. torn off, and 52 per cent. removed for other causes. As no indication of kinking could be found in any of these hose (on this road the "coupling hook" is not used on freight), it is fair to presume that they were an average lot of old hose turned into the repair shop, of which it can practically be said 38 per cent. were damaged by allowing the hose to hang unprotected.

In view of the foregoing, it is the opinion of the committee that a well designed and properly located dummy coupler should be used on all cars equipped with air-brakes. A coupler to fulfill these requirements must be strong, so as to withstand rough usage, and allow a freedom of motion so as to give the hose its natural curve, and must cover the opening effectually. An additional requirement has been suggested, that the bearing surface should be made of brass, for it has been anticipated that the hose gaskets may become ruined from the action of a corroded surface against it.

Air Pump Exhaust for Passenger Train Heating.—(Committee: F. F. Coggin, E. G. Desoe, C. S. Hall and T. A. Hendendahl.)

One object of using the air pump exhaust for this purpose is a direct saving in fuel consumption on the locomotive, the other is in allowing what steam is generated in the boiler to be used in the engine cylinders, in place of there being a constant drain back in the train for heating purposes. The use of exhaust steam for heating buildings has been for many years in use and the economy of such systems, under proper conditions, is beyond question. Many attempts have been made to use exhaust steam from the main engine cylinders of locomotives for heating purposes, but no satisfactory results have as yet been obtained, the conditions of a modern stationary plant and of a locomotive being so widely different. Attempts have also been made to use the air pump exhaust for this purpose, in several instances, but the measure of success obtained was evidently not such as to warrant the adoption of the method for general use.

One of the difficulties of using exhaust steam from the air pump consists of the large amount of water which is discharged from the pump. As is well known, the action of the pump while on the road is intermittent. While the pump is inoperative, or nearly so, much condensation takes place, both in the steam cylinder and the pipe leading to it, and on each restarting of the pump this condensation is discharged along with the steam, the first few exhausts containing much water. Now if this exhaust were to be discharged directly into the heating pipes of the train, it may readily be seen that the result would be to fill the pipes with water and the heating results would be poor; again, it would be very difficult to obtain a good circulation through the radiators of the cars, particularly with trains of any length. This difficulty seems to have been entirely overcome by the method used for the last two winters on roads in New England, a brief description of which seems to be in line with the purposes of this paper. [See *Railroad Gazette*. Feb. 22, p. 125.]

On many roads engines use air for sand blowers, bell ringers and other purposes, and Pullman cars use air for elevating water. The result of these calls for air from the brake system means more work for the pump and consequently more exhaust steam for heating purposes. Careful observation of the performance of air pumps on express trains, even where no air is used for braking purposes, shows that they work to a far greater extent than many people imagine. In order to determine this point the committee placed a counter on the air pumps of the engines drawing trains on four of the largest roads in New England and a table of the readings taken from the same is embodied in this report. The trains were chosen at random; some trains making many stops and others but few, and we think that they substantiate the statement as to the amount of work performed by the pump while on the road.

With the large air pumps now in use on locomotives exhausting steam at a very high pressure, there can be no question as to the large amount of heat which is wasted.

Performance of Air Pumps.

No.	Pump.	No. of cars.	Miles.	Time in minutes.	Stops.	Slow ups.	No. of exhausts.	Ave. exhausts per minute.
1	9½	8	136	240	12	5	7,916	32.98
2	9½	8	136	305	32	5	11,916	39.07
3	9½	4	46	102	17	2	2,332	22.86
4	9½	2	38	84	11	3	2,330	27.74
5	9½	6	82	170	21	3	6,734	39.61
6	9½	3	23	62	21	1	2,560	41.29
7	9½	6	9	20	4	2	986	49.30
8	9½	3	14	37	14	1	1,880	50.81
9	8-in.	3	23	63	22	2	3,434	54.51
10	9½	8	108	240	27	5	15,948	66.45
11	9½	3	109	275	36	4	8,196	29.80
12	9½	3	109	255	31	5	7,706	30.22
13	9½	5	82	167	20	4	4,884	29.25
14	9½	7	82	140	8	4	5,718	5,718
15	9½	6	84	185	19	1	6,624	35.81
16	9½	8	108	220	22	3	7,072	32.15
17	9½	8	108	174	2	6	6,360	36.55
18	9½	8	114	174	6	4	8,534	49.05

As to the effect of the appliance on the pump, there are many who had the impression at first that this back pressure would stop the pump and that trouble would be experienced in maintaining the proper air pressures for the air-brake. To obtain some information on this point the committee made a test on the 9½-in. air pump working against 90 lbs. main reservoir pressure, 60 lbs. back pressure on the pump, and 185 lbs. boiler pressure. The pump readily made upwards of 150 strokes per minute under these conditions. Many prominent air-brake men who have carefully examined this device, express the opinion that it is a great benefit to the pump, in that the exhaust being cushioned prevents the pump pounding and it is a noticeable fact that the noise of the pump is reduced to the minimum. Some might say that with this back pressure it would take more steam from the boiler to operate the pump. This the committee did not doubt, and in order to determine this point a series of careful experiments were made in the following manner.

A new 9½-in. pump was set up in the air-brake test room of one of the New England railroads, this room containing

a testing boiler on which pressures corresponding to the modern locomotive are daily carried. A counter was placed on the pump, a plentiful supply of gages arranged to give the various pressures at the points desired, a condensing apparatus which would readily condense the exhaust from the pump, and a means for accurately weighing this water. A large number of readings were taken under the different conditions, each consisting of 1,000 exhausts of the pump, and the averages were taken from these readings. The following table gives the results of three tests made with a 9½-in. air pump, and suitable apparatus for condensing the exhaust steam:

Test No.	Size of pump.	Ave. boiler pressure.	Highest average pressure in steam cylinder.	Main reservoir pressure.	Exhaust free, or lbs. back pressure in steam reservoir.	Strokes per minute.	No. of exhausts.	Lbs. of water from condenser per 1,000 strokes of pump.	No. of galls. of water from condenser per 1,000 strokes of pump.	Temperature of water when weighed.	P. C. of steam saved from air pump exh'st which may be used for heating purposes.
1	9.5	195	98.5	90	Free	75	1,000	136.5	16.4	70.5	None
2	9.5	195	120.5	90	30	75	1,000	149.8	17.98	80.0	91.2
3	9.5	195	150.5	90	60	75	1,000	172.2	20.67	84.0	70.0

Note.—The pump used was a new one direct from the works.

Each of the three tests was checked by taking the average of four readings, a thousand exhausts in each reading. The first test was made with a free exhaust; the second with 30 lbs. back pressure, and the third with 60 lbs. back pressure. The per cent. column was figured on the basis (in tests 1 and 2) that 1.58 gallons of water, additional, is required in order to utilize the product from which the 16.4 gallons was obtained, and which was heretofore wasted under the free exhaust. The same comparison can be made between tests Nos. 1 and 3.

From these figures it will be seen that we required about 16½ gallons of water to be evaporated in order to get 1,000 exhausts from the pump working against 90 lbs. main reservoir pressure with an open exhaust, and that in order to carry 30 lbs. back pressure at the steam receiver to utilize this steam for heating purposes, it took about 1⅓ gallons more water per thousand strokes, and our table of the saving when using the exhaust for heating purposes is based on these figures. In connection with the results obtained from these tests, is it proper to say that the motive power departments of the various roads using this method of heating are unanimous in the opinion that there is a marked saving in the fuel consumed and water evaporated as compared with heating trains direct from the boiler.

Terminal Test Plants.—(Committee: S. D. Hutchins. W. T. Hamar, W. P. Huntley, Otto Best and C. C. Farmer.)

The importance of yard, or terminal air-brake testing plants has been presented at different times by very able committees who have covered the ground so thoroughly that little remains to be said on this subject. These reports have brought out the indisputable fact that yard-testing plants are not only important but absolutely necessary to the proper and economical maintenance and operation of air-brakes on both freight and passenger trains, and that the majority of railroad companies throughout the country has evidently as yet not awakened to a realization of this fact. A large percentage of damaged draft rigging, damaged lading, worn out or burned out air pumps, runaways on heavy grades, etc., is caused by defective air-brakes, such as dry or leaky cylinder packing leathers, dirty or worn triples, improper repairs to same, leaky train and retaining valve pipes, and pistons traveling full length of cylinder. These things can only be overcome by the installation of well devised yard-testing plants, properly conducted by a corps of intelligent air-brake inspectors.

Reclaiming air-brakes from their present deplorable condition is a matter of considerable seriousness and magnitude. In fact, we think it is a matter that should be taken in hand at once by the proper authority—superintendents of motive power and master car builders—who, we think, could by strongly agitating the question of yard-testing plants, bring about a condition of affairs in this respect by which all railroad companies would do their share of the work, rather than having a few of the more generous and enterprising roads doing it all. Brakes cannot be reclaimed or maintained by only a few of the roads caring for them. The object sought for will only be had when some universal plan is adopted whereby an air-brake may have the proper attention when away from home. Some protective system should be adopted by railroads whereby brakes coming in on their own lines from other roads shall be in first class condition before the car be accepted, and a system of defect cards established, whereby disorders arising en route may be reported and corrected upon reaching a terminal with as little loss of time as possible. This will in a great measure compel each company to do its share of the work, and allow very few brakes to pass off a line except in good condition.

The details of this arrangement, however, will have to be worked out by the master car builder. In this connection it might be well to make the interchange repair prices high enough to induce owners to increase their facilities and make every effort to maintain their brake apparatus in first class condition. Reclaiming and maintaining air-brakes will consist principally of such work as organizing a well selected air-brake force and establishing a system by which the triple valves and brake cylinders will be examined, cleaned and oiled at least once a year, and this, regardless of the mileage of the car; the tightening up and securing of all brake cylinders and reservoirs to the car body, and the substitution of a well devised pipe clamp for the staple that is at present in a great many cases used to secure the train and retaining valve pipe to car body. Other things are the absolute prohibition of fluid oil for car-brake cylinders, grease being used instead. The gaging with proper templates all air hose couplings, when sent in for remounting, and the close inspection of all in service, or, we might say, all couplings that do not couple with the usual freedom of couplings in first class condition. While pulling couplings apart is always liable to induce leakage in them and the hose, the bent coupling almost insures this result, being also a common cause for torn-off hose. . . .

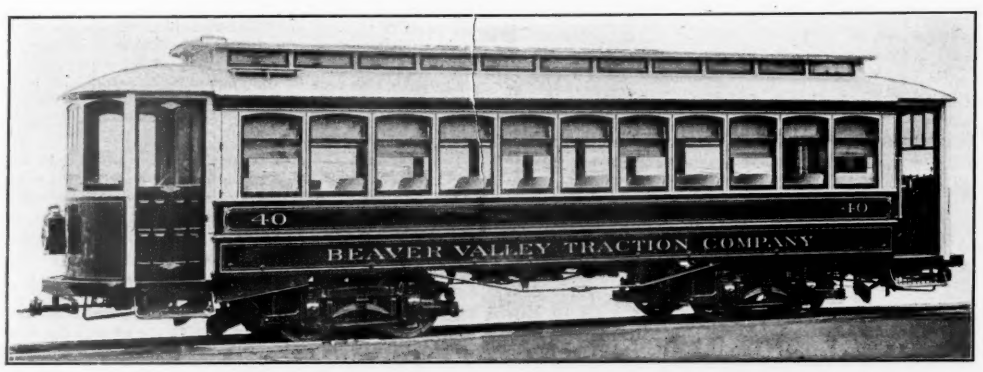
We trust the advent of the larger air pump on locomotives will not be used as a pretext for any further delay in the installation of yard-testing plants. There are at the present time in this country nearly 1,250,000 cars equipped with air-brakes. The approximate cost of these brakes is between $45,000,000 and $50,000,000, and it is safe to say that not over 50 per cent. of these brakes on freight cars are in first class serviceable condition, with the tendency toward deterioration instead of improvement, and can only be diverted by some arrangement for their redemption and care. Testing plants are needed at all repair yards, terminals and relay points. New yards should be so designed and old yards so redesigned, as to provide facilities for testing all trains on arrival or the tracks so piped that in making up trains cars can be placed on a piped track.

The report concludes with descriptions of the D., L. & W. air-brake testing plant at Scranton, Pa., and the L. S. & M. S. plant at West Seneca.

The "Progressive Form of Air-Brake Questions and Answers" was revised by adding to the old list of questions addenda covering the following subjects: The Westinghouse high-speed brake; the slide valve feed valve attachment; the Westinghouse schedule "U" or system of high-pressure control; the automatic slack adjuster and the New York air-brake.

A Semi-Convertible Suburban Car.

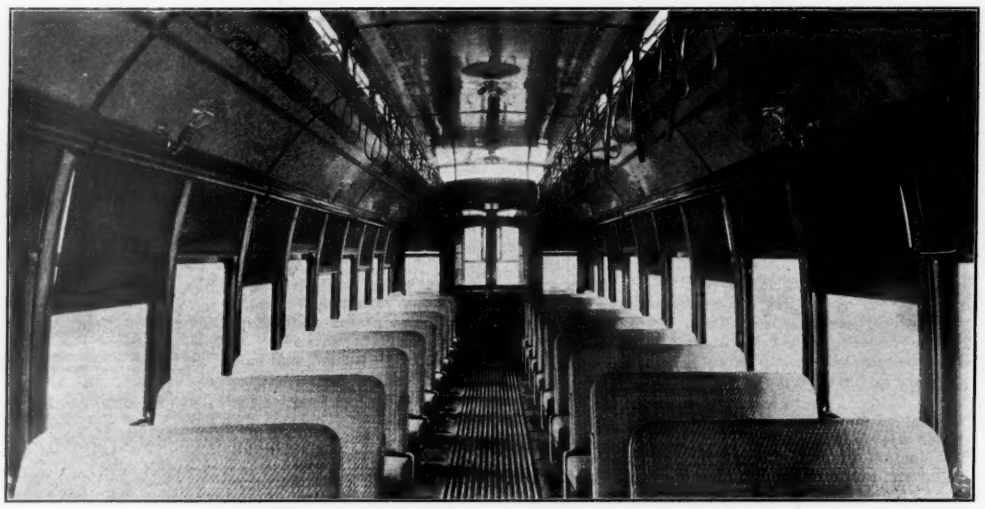
The J. G. Brill Company has recently brought out a car designed by Mr. John A. Brill, which is shown in the engravings from photographs. As seen here it is as used on electric roads, but the Brill Company looks upon this as a desirable car for suburban use on steam railroads. It is lighter than the standard suburban coach; there are some conveniences in the arrangement of seats; the side



A Semi-Convertible Suburban Car.

framing is strong, and it can be quickly converted from an open to a closed car, or the reverse. It is obvious that a light car, which is still reasonably strong, is especially to be desired where stops are frequent, where engines should be light, and yet where quick acceleration is important.

A leading feature of the car is a side considerably lower than usual, which can be made either straight or curved, the steam car truss plank bolted to posts and sills being used. The posts are double, glued together, with the tie rod enclosed between them. The window sash are double, large in size and slide up in pockets framed in the roof.



Interior View of Semi-Convertible Car.

The roof does not differ materially from the ordinary standard form. The lower car lines and heads of the posts, the rail and the letter board are so combined as to give more than ordinary strength.

The sash can be raised or lowered as easily as in the ordinary car window, and thus we have a car always in service, suitable for pleasant or for stormy weather.

By a new arrangement of seats, together with the method of side construction, a gain of some 6 in. is made in the available width inside of the car without increasing the external dimensions. The seats are placed between the posts, their ends resting on the truss plank. The increased width is usually equally divided between the seats and the aisle. The increased width of the aisle is advantageous in a suburban car as it enables passengers to reach the platform quickly and with ease. Two or three inches make a great difference in the comfort of the passenger.

Hudson River Tunnels.

One of the contributions to the discussion last month of Mr. Buchholz's paper on "All-Rail Connections Across the Hudson River," before the New York Railroad Club, was the following from Mr. J. V. Davies:

"I am aware that there is a general feeling on the part of engineers which I know to be shared by Mr. Buchholz) that the materials on the bed of the Hudson River are not adapted for the safe construction of tunnels under that river. A part of this feeling has had good cause in the checkered history and difficulties of the old Hudson River Tunnel, and it is from the object lesson of the present condition of that work that I would draw my conclusions.

"The material on the bed of the Hudson River is a stiff clay silt produced by the scour and erosion of the ancient rocks of the entire Hudson and Mohawk Valleys. Below this silt formation is a more or less hard and compact sand. The present deep channel of the Hudson River is on the New York side of the center of the river, whereas the ancient deep channel of the Hudson Valley in its glacial era was unquestionably along the line of the Palisades and consequently very near to the ends of the piers of what is now Jersey City. In this ancient channel there is no rock bottom to be found for over 200 and very probably in many parts for over 300 ft. depth below water level, whereas under the shore both of Jersey City and of New York City the rock comes up to within sixty (60) ft. of the surface.

"At the time of commencement of reorganization proceedings in connection with the Hudson Tunnel Co., about 18 months or two years ago, we pumped out the old works and bored a number of holes though the iron lining of the present portion of the tunnel in order to ascertain the condition of material in the rear. The consistency of this material is about equal to a stiff brick clay. It is very easy material to tunnel in with a shield and the completed tunnel will be very nearly perfectly water-tight. There have been so many state-ments made with regard to the flotation of the tunnel that we have carefully checked both alignment and profile of the already completed tunnel as it exists to-day. There is no indication that any change has occurred in the position of this old tunnel and I do not believe that any is likely to occur. On the other hand, I am aware that there is a feeling on the part of other engineers that the impact and vibration of railroad trains would after a time pound the tunnel down lower into the clay. This is a possibility, but not by any means a likelihood. At the same time I would by no means advocate the construction of any tunnel under the Hudson River for the purpose of steam traction with an ordinary locomotive engine. I do not consider that a tunnel under that river

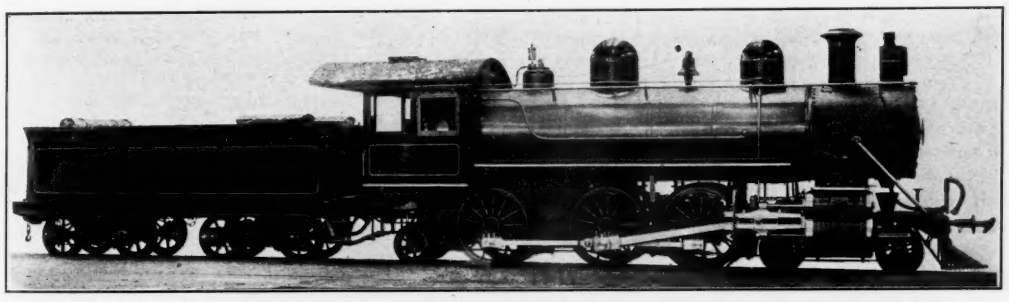
and for the great length which it would require to be constructed and for passenger service in this city, is in any respect adapted for that class of transportation. If, therefore, it is necessary to the railroad interests terminating at Jersey City that the trains consisting of Pullman cars or equally large passenger coaches, with their main line engines, should be transported without breaking load, direct into the City of New York, then I would most certainly not advocate the construction of tunnels for that purpose and consider that a bridge would be the only means for effecting that transportation if the bridge engineer can show that it is feasible at the present day to construct a railroad bridge over the great span necessitated by the width of the Hudson River.

"On the other hand, however, for local service between the suburbs in New Jersey and the Borough of Manhattan by use of electric traction, either by motor cars in units or in trains, or even with moderate length of trains operated by electric locomotives so that the concentration of weight in the locomotive is not extremely excessive, then I consider that the eminently feasible and economical plan to adopt is the construction of tunnel. These tunnels can be multiplied to any number dependent only upon the necessary number of railroad tracks which are required and limited by the population to be moved per day.

"The past history and experience in the Hudson River Tunnel and in the East River Gas Tunnel makes it evident that a modification is needed in the design of the lining and in the arrangement of track construction and the sizes of the tunnels as well as in the depth and grades of the tunnel itself. With these provisions, however, I feel perfectly confident that thoroughly efficient and permanent tunnels can be constructed under the Hudson River for transportation use and they will unquestionably be cheaper in first cost than any bridge which, with our present knowledge, it is possible to construct over the waters of that river."

Vauclain Compound Six-Coupled Freight Locomotives for West Australia.

The Baldwin Locomotive Works have recently built 20 compound freight locomotives of 3 ft. 6 in. gage for the Government Railways of West Australia, one of which is shown from a photograph. The engines have



Vauclain Compound Freight Locomotive for West Australia.

a 4-wheel leading truck and a 2-wheel trailing truck, the wheels and journals for both of which are of the same dimensions, namely, wheels 26 in. diameter and journals 4¼ in. x 7½ in. The cylinders are 12 in. and 20 in. x 22 in.; the driving wheels are 54 in. in diameter and the driving wheel journals 7 x 8 in. The driving wheel base is 11 ft. 6 in., the total wheel base of engine 26 ft. 3 in., and the total wheel base of engine and tender 49 ft. 2½ in. The weight on drivers is 71,020 lbs.; on the front truck 24,400 lbs., and on the trailing truck 7,800 lbs., making a total weight of 103,220 lbs. for the engine, and the engine and tender complete weighing 163,000 lbs.

The barrel of the boiler is 56 in. in diameter and the thickness of sheets 9-16 in. The working pressure is 200 lbs. per sq. in. and balanced piston valves are used. The fuel will be lignite coal and the fire-box is copper 102 in. long, 29 in. wide, 59 in. deep at front, and 51¾ in. deep at back. The thickness of the sheets in the fire-box is, sides ½ in., back ½ in. and crown ⅝ in. The tube sheets are ¾ in. and ½ in. thick. There are 259 copper tubes 1¾ in. diameter and 12 ft. 7 in. long. The fire-box has 121 sq. ft. of heating surface, and the tubes 1,478 sq. ft., making a total of 1,599 sq. ft. for a grate area of 20.5 sq. ft.

The tender truck wheels are 33 in. in diameter and have journals 4¼ x 8 in., the tank capacity for water being 3,000 gallons.

Fast Run on the Great Northern.

The fast run made by a special train over the Great Northern from Seattle to St. Paul, April 18, 19 and 20, which was briefly noticed in the *Railroad Gazette* of April 26, was made at an average speed, including stops, of 38 miles an hour. We have received a letter from General Superintendent Ward which makes a few changes in the time and distances. Mr. Ward says that no special effort was made to show a particularly fast record; if effort had been made the speed would have been much faster. At Larimore, N. Dak., the train was diverted to the line by way of Breckinridge and Willmar; over the main line much higher speed could have been made. The run is noticeable as having been made by only four locomotives. One engine, No. 909, hauled the train from Spokane to Larimore, 740 miles. Conductor McCormick and Enginemen Olson and Kilbane took the train through, being assisted where necessary by local crews.

There were three cars in the train from Seattle to Spokane and two cars the rest of the way.

The time given by Mr. Ward is as follows:

Miles.					
	Seattle.....	Thursday, April 18,	leave	11:10	a. m
143	Leavenworth..	" " "	arrive	4:00	p. m.
	Leavenworth..	" " "	leave	4:10	p. m.
340	Spokane.....	" " "	arrive	9:35	p. m.
	Spokane.....	" " "	leave	10:00	p. m.
726	Cut Bank.....	Friday, April 19....	arrive	9:20	a. m.
	Cut Bank.....	" " "	leave		
1287	Minot.....	" " "	leave	11:39	p. m.
1466	Larimore.....	Saturday, April 20..	arrive	3:36	a. m.
1811	St. Paul.....	" " "	arrive	12:55	p. m.

Deduct two hours for change in time.

East of Cut Bank, descending the Rocky Mountains, the train was run as fast as 84 miles an hour at times.

The Electrical Equipment of the Manhattan Elevated.

In our issue of Nov. 30, 1900, page 793, we gave an outline description of the new electric power station of the Manhattan Elevated, a general description of the first six-car test train which was equipped and tried about that time, and a statement of the progress of the work of general equipment. Among later developments is the award of a contract to the General Electric Company for the electrical equipment of the lines. In our earlier reference to this work we noted the award of the generators and other power house equipment to the Westinghouse Electric & Mfg. Company.

In the car equipment there will be 1,600 G. E. No. 66 motors, nominally rated at 125 h.p. and controlled by the multiple unit system, this covering the new arrangement of two motors for each of 800 motor cars to which we shall refer later. The General Electric Company has agreed to deliver the first of the new motors within three months, and the entire delivery is to be made within 21 months from the signing of the contract. It is estimated that the complete electrical installation will require about two years. The line equipment of the Second avenue track is now finished and work is rapidly advancing on the Third avenue line.

The part of the work alloted to the General Electric Company involves nearly $3.000,000, and the apportionment of the line work and the power house work divides the contract total between the General Electric and the Westinghouse companies, the Westinghouse portion of the expenditure being somewhat in excess of $2,000,000. One interesting incident of the equipment is the building of a special boring machine by William Sellers & Co., with which to finish some of the Westinghouse generating equipment. This is said to be the largest machine of its kind ever built and special arrangements were necessary at the Westinghouse Company's plant for the installation of the machine, which is to cost about $40,000.

The equipment of the power house at Seventy-fourth street to Seventy-fifth street and East River is being pushed rapidly. Of the eight 8,000 h.p. engines, to which we referred in our earlier article as giving a total of 64,000 h.p., one engine is now partly erected in the power-house. Of the 32,000 total of boiler horse power 1,000 boiler h.p. is now set up and finished, and 2,000 boiler h.p. is being set up. There are to be 16 large economizers in all and two of these are now being erected.

On Nov. 30 we described the test train of six cars as being run with a motor car at each end, each motor car having four motors of the same capacity as those here referred to. The motor cars had a steel underframe and several other features which were original with General Superintendent William E. Baker. This first motor car design has been abandoned. A new motor car with wooden underframing is being designed by Mr. Baker, and it is now intended that the apportionment of motors shall be two motors to each of four cars in every six-car train, the makeup of the train being as follows: Car No. 1, head end, motors; car No. 2, a trailer; cars Nos. 3 and 4, motors; car No. 5, a trailer; and car No. 6, a motor car. Trains of five cars will no longer be used in the service and it is therefore apparent that, when in the rush or slack hours of the traffic it is necessary to increase or reduce the number of cars, the yard work will be extremely simple. The first reduction from a six-car train will consist of cutting off a motor car and one trailer from one end of the train, thus reducing the regular day service to trains of four cars, three of which will be motor cars. When it becomes necessary to use the three-car train service the motor car which we have referred to in the order of location as No. 3 will be detached and run into the yard. There will be no further occasion for reduction of the number of cars until the hours of the midnight service are reached, when the first switching operation at the yard will be necessary and the trailer referred to as car No. 5 will be switched out and the midnight service will consist of trains of two motor cars.

It is apparent that this makeup of trains will give great flexibility in regard to the number of cars and the readiness with which they may be handled from the yards to the line by their own motive power. The necessity of using the crossovers at terminals, such as the blind end of the Third avenue line at City Hall, is entirely eliminated with this plan, just as it was in the arrangement which we described on Nov. 30. The midnight trains are so few, and all other demand for two-car trains so rare, that the amount of actual switching required will be insignificant.

The Trans-Baikal Railroads.

More definite information than was heretofore accessible is given in a guide book published by the Russian Ministry of Transportation concerning the "Trans-Baikal Railroads," as the parts of the Siberian Railroad east of Lake Baikal are called. There are two of these lines, the one which in the original plan was the sole one, extending from the station and port on Lake Baikal called Myssowaja, northeast and east through a difficult country to Stretensk, at the head of navigation on the river Schilka, a tributary of the Amoor, a distance of 681 miles. By the original plan this line was to be continued down the Amoor to a junction with the Ussuri Railroad, some 500 miles northeast of Vladivostock, which extension the agreement with China for a railroad through Manchuria made unnecessary.

Surveys for the Trans-Baikal Railroad began as long ago as 1887, and the route actually followed differs in important particulars from that first adopted. In 1897, when a great deal of work had been done, heavy summer rains and the sudden melting of the snow in the mountains caused floods which destroyed a large part of the earthworth, bridges, etc., to restore which cost $2,850,000. The original estimate of the cost of this line was $44,000 per mile, including rolling stock; its actual cost has been about $45,500 per mile. It is laid with rails weighing 49 lbs. per yard, like the line west of Lake Baikal, which is already found to be a great mistake, as not only does it compel the use of light engines, but in the terrible cold the rails frequently break. There are 34 stations on the line, an average of one in 20 miles; but some intermediate sidings are provided, and it was claimed to be capable of passing 14 trains a day in both directions. It is said, however (but not in the *Guide*), that so far the greatest practicable number has been 8. The road was opened informally in January, 1900, and for regular traffic the following summer. Its steepest grade is 88 ft. per mile.

What will now be the Pacific line of the Siberian Railroad diverges from the above line at Kaidolowo, 519 miles eastward from the Lake Baikal terminus, and extends in a generally southeastern direction through a generally desolate region to the Chinese border, whence it will be continued to Vladivostok and Port Arthur (or more correctly, to Dalnie) by the Chinese Eastern. We have heretofore published some account of the methods followed in its construction, as described by the engineer, Ipsberg, who was employed on it. It is 215 miles long and has some heavy work, cuttings in hard rock 49 ft. deep and fills 88 ft. high, and grades of 88 ft. per mile. Its cost is about $70,000 a mile. On this line, as on all parts of the Chinese Eastern, 65-lb. rails are laid, and such rails are to be substituted for the light ones further west throughout the Siberian Railroad, as fast as practicable. The country on this line is arid, and snow seldom falls, but thermometer in winter does not get above zero and falls to 40 deg. below; while the earth a few feet below the surface never thaws.

Foreign Railroad Notes.

Early in April there were lying at the stations of three Russian railroads, waiting to be forwarded, 27,000 carloads of grain, equal to about 12,000,000 bushels, much of which had been waiting for months. The complaint that the railroads are not able to handle their traffic is common in Russia.

A specially trained sanitary troop has lately been drilling near Berlin. Among the tasks set for it to perform was the transformation of cars of different kinds into hospital cars with berths for sick or wounded. The time required for such a transformation was 3½ to 5 minutes per car.

Many robberies having been committed recently on the Russian Southwestern railroads orders have been given that while trains are stopped at main stations guards shall be detailed with lanterns to watch the side of the train opposite the station and prevent any one entering on that side. The guards, before any passengers have entered a train, are to search the insides of the cars and also their roofs to make sure that no one has hidden himself there. Passengers must not be permitted to pass from one car into another. Men who jump off or upon a train while it is running are to be followed up and arrested. The number of guards is increased.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The Hudson River bridge matter has been a lively and interesting topic in New York city and thereabouts for some weeks, but probably it will now gradually fade out of sight and be forgotten for some months to come. The Governor vetoed the bill under which the New York & New Jersey Bridge Company hoped to build an approach along West street. Very briefly stated, his reason for vetoing the bill was that it was an effort by the Legislature to interfere with the right of the people of the city of New York to manage their municipal affairs. Whether or not he was correct in taking this view of the matter we need not discuss now. That bridge project, therefore, will have to sleep until an adjustment is made with the officers of the city, which does not seem likely to come about soon. Meanwhile the North River bridge has again come to the front. The New York & New Jersey bridge is the one designed to cross at 59th street; the North River bridge is the one designed to cross at 23d street. Interviews with officers of this company say that the Pennsylvania Railroad is backing it, and that it is designed to be simply a passenger bridge, and that it will cost something like $100,000,000. It is doubtless quite safe to say that the Pennsylvania Railroad Company, as a company, is not backing this bridge, and that no other railroad company is backing it other than to agree to deliver a certain amount of traffic in case the bridge is built. We doubt if any financial guarantee whatever will be given by any of the railroad companies.

Locomotive Testing Plants.

It now seems probable that the present year will be marked by the installation of several locomotive testing plants. One is to be built by West Virginia University, at Morgantown, and another by the Iowa State College, at Ames. It will be remembered, also, that the Pennsylvania Railroad has long since authorized the installation of a plant at Altoona, the construction of which has been delayed by the pressure of other business. It is now reported that the Atchison, Topeka & Santa Fe has made an appropriation for a plant to be established at its Topeka shops, and that one of the larger locomotive building establishments has bought ground upon which to build a plant for use in running new engines under steam before they are sent out.

The proposed plant of West Virginia University has its beginning in a donation of an American type locomotive by the Baltimore & Ohio Railroad. Delivery has not yet been made, but engine No. 625 has been set apart for the purpose, and is to be put in first-class condition before being turned over to the University. The engine selected has 17 x 24-in. cylinders, and weighs 72,000 lbs. The details of its mounting mechanism have not yet been decided upon, and the precise location of the plant is just now in some doubt. The University has a new mechanical building in construction, in which the locomotive will probably find a place, but this cannot be made certain until the Regents have approved certain necessary changes in the drawings for the building. All matters relating to the proposed laboratory are in the charge of Professor Clement R. Jones, of the department of mechanical engineering.

The Iowa State College has received an American type locomotive having 16 x 24-in. cylinders and weighing about 75,000 lbs., as a gift from the Chicago & Northwestern. The engine as delivered is complete with tank attached. At present it is being used on a short length of track for purposes of valve setting and for such demonstrations as are possible with the limited facilities available. The plans, however, involve a testing plant similar to that at the Chicago shops of the Northwestern Railroad, and some progress has already been made in its installation. Professor G. W. Bissell, who has the matter in charge, proposes to proceed in the gradual development of the plant as from time to time funds may be available for the purpose.

In connection with the above it will be of interest to note that it is now ten years since the first locomotive testing plant was established by Purdue University. This plant has so well served to demonstrate the value of laboratory methods in testing locomotives, that it received soon after it was started the unqualified approval of the Master Mechanics' Association. It has served, also, in various important investigations, the results of which have from time to time been summarized in the columns of the *Railroad Gazette*. In 1894 a testing plant was improvised at the Kaukauna shops of the Chicago & Northwestern by Mr. Robert Quayle. The ingenuity exhibited by Mr. Quayle in bringing this plant into existence, and the value of the results which were obtained by its use, are equally noteworthy. Having selected a passenger car truck, Mr. Quayle lengthened the frame to make the wheel spacing equal to the distance between the drivers of the locomotive which he proposed mounting. Selecting an unused side track, he next removed a short section of the rails, and in their place excavated a shallow pit into which the truck turned upside down was placed. The wheels of the truck were thus brought in line with the rails of the side track. The drivers of the locomotive were next placed upon the wheels of the inverted truck, and loaded cars with brakes tightly set were coupled before and behind the locomotive to hold it in place. Load was supplied by the application of the usual brakes both to the wheels of the supporting truck and to the drivers of the locomotive, while jets of water were employed to carry off the heat. By these means Mr. Quayle was able to operate his experimental locomotive under fairly constant conditions, and to duplicate conditions with a fair degree of certainty. He was successful in securing important data for the Master Mechanics' Committee on Exhaust Nozzles and Steam Passages, of which committee he was Chairman. Two years later, in 1896, Mr. Quayle installed a plant of a much more permanent character at the West Chicago Shops of the Chicago & Northwestern, which has since served in numerous investigations conducted by that road. That which is best known, though perhaps not the most important, is his elaborate research in continuation of that previously conducted for the Committee on Exhaust Nozzles and Steam Passages, to which reference has already been made. This plant has been well maintained since its original establishment four years ago, and is frequently called upon to render important service to the road.

Having yielded to a spirit of reminiscence, we will call attention to the very active interest in locomotive testing which was manifested a few years ago by the Master Mechanics' Association. It was then proposed to raise a fund of several thousand dollars, and to conduct an extensive series of tests for the purpose of determining the relative efficiency of simple and compound locomotives. The proposition, after being before the Association for three years, was finally dropped because of inability on the part of the Association to provide funds with which to meet the necessary costs. The action, however, was in the nature of a postponement. It was voted that the committee entrusted with the matter be discharged, but that the subject of shop tests of locomotives be continued until such time as the Executive Committee should see its way clear to go ahead with the tests which had been outlined.* This was six years ago, and the failure of the project was generally attributed to the depression of business then prevailing. Under present business conditions, it is probable that no great difficulty would be encountered in carrying such an enterprise to a successful issue. A systematic study of the old problem of simple *vs* compound locomotives still remains to be made, and many new problems have been introduced by the advent of simple engines of recent design. Questions now arise as to the effect of increasing the length of flues, the limiting conditions affecting area of grates, and the most advantageous form of draft appliances for use in connection with boilers of large diameter. Definite information concerning any of these questions would have a money value to any railroad, and it would seem that the time is now at hand when the Master Mechanics' Association might well renew its efforts to promote locomotive testing.

*Proceedings of the American Master Mechanics' Association, 1895, p. 143.

The Contest for Control of Northern Pacific.

The enormous speculation for the rise in stocks which has been going on in Wall street almost without interruption since election time came to an abrupt end on Thursday of last week when Northern Pacific common touched $1,000 because all the available stock had been absorbed by one or the other of two great banking interests in New York in an effort to control the company. In this competitive buying the shares had been forced up to about $150; they were quoted around 80 at the beginning of the year. The contracts to deliver stock were bought up by the banking houses and the question of which interest held a majority of the stock rested on so narrow a margin that for a time neither interest would release from their contracts those who had bargained to deliver Northern Pacific and the Wall street community had been plunged into a most extraordinary fright.

This cornering of the capital stock of a great railroad with $155,000,000 outstanding capital was the immediate result of the apprehension aroused among those who control the Union Pacific and who believed that the Union Pacific must be protected from what they regarded as a menace to its position involved in passing of control of the Burlington to the Northern Pacific and the Great Northern as recently arranged. The Burlington has long planned a westerly extension parallel to and near to the Union Pacific.

In order to better comprehend the situation, which has led up to the present strange result, where the two greatest of financial interests of this country are contesting for control of one railroad, whose shareholders in 1896 were being assessed $10 and $15 per share, it is necessary to go back some months. In January of this year Mr. J. Pierpont Morgan went to the directors of the Chicago, Milwaukee & St. Paul Railroad and proposed the purchase of control of that road. In whose interest he acted has never been officially divulged. No risk is assumed in saying that the property would have been turned over to and operated in the interest of the Northern Pacific and the Great Northern. But the directors of the St. Paul, who represented very strong and independent financial interests, would not sell control and sacrifice its position as an independent line. This ended the so-called St. Paul negotiations.

Not long after this, enormous buying developed in the Burlington stock. These purchases were made to secure the Burlington for the Great Northern and Northern Pacific interests. Mr. Morgan was not active in this Burlington movement, although, of course, he was a party to it. Control of the Burlington was undoubtedly chiefly conceived by and carried through by Mr. Hill. Mr. Morgan and Mr. Hill have been allied in controlling the railroad situation for more than six months past. Since last summer the Northern Pacific and the Great Northern which previously since the failure of Mr. Hill's London agreement to obtain control of the reorganization of the Northern Pacific, had been in close rivalry, have been working in harmony. When Northern Pacific directors, last June, passed the extra dividend on the common shares, which had been paid for the previous quarter, on account of the bad outlook for traffic involved in the failure of the spring wheat crop, Northern Pacific common shares sold below $50 per share, and around these prices Mr. Hill was a heavy investor, and is generally credited with being the heaviest individual stockholder. Soon after he made an alliance with the Morgan interests, which had reorganized the Northern Pacific, and have since controlled its management.

Mr. Hill being aware that the Burlington directors would hardly agree to voluntarily surrender control, bought nearly if not quite a majority of the stock of that road in the market, and made no formal proposal to the Burlington directors until he held so large a block of shares that he controlled the Burlington situation. The Union Pacific capitalists, the most influential of whom had up to last year been Mr. Hill's bankers, say that Mr. Hill, when asked if the Burlington was being bought for the Northern Pacific denied knowledge of the facts, and that when the purchase of Burlington was acknowledged they asked Mr. Hill to protect the Union Pacific. Mr. Hill declined to do this.

Then Kuhn, Loeb & Co. began their heavy purchases, and two weeks ago again went to Mr. Hill and said that they controlled 43 per cent. of the Northern Pacific stock. They offered to give a permanent proxy to J. P. Morgan & Co. on their holdings if some arrangement would be agreed to to protect Union Pacific. This failing, there

began the buying of the stock in the open market to bring the Hill-Morgan holdings up to a majority, if possible. Both the Morgan-Hill interests and the Union Pacific people now claim to control a majority of the Northern Pacific stock.

Annual Reports.

Michigan Central.—The fifty-fifth annual report of the Michigan Central is for the year ending Dec. 31, 1900. The miles operated were 1,635.48, which includes 14 miles of trackage right on the Illinois Central tracks from Kensington to Chicago. On this mileage the gross earnings were $16,730,131, or $1,023 per mile. The increase, as compared with the year before, was $1,226,000, and the working expenses were $13,229,490, with an increase of $1,225,000 as compared with 1899. The net earnings were $3,500,641, but a trifle over those of the year before. The percentage of expenses to earnings, including taxes, was 79.08, excluding taxes 76.28. The increase in working expenses runs all the way through, but was particularly heavy in maintenance of road and in repairs of locomotives. This item was a little over $1,000,000. The increase, as compared with the year before, was $434,000. Of course, the item of conducting transportation also increased with the greater volume of business. Expenses were charged with the cost of all betterments and additions to property, except $80,000 set aside out of the net revenue of the year and credited to a special fund for building a second track between Ypsilanti and Dexter.

The tons one mile amounted to 2,006,102,840, the increase over the year before having been 2.84 per cent. The rate per ton mile was 0.592 cent as compared with 0.564 in 1899. The passenger miles and rate also increased, the miles having been 177,031,000 and the increase 7.44 per cent. The average rate was 2.194 cents, and the year before it was 2.181.

After payment of interest and rentals there was a net revenue of $4.49 per share, from which 4 per cent. dividends were paid, to the amount of $749,520.

In the eight months ending with August last the Siberian Railroad reports that it carried 779,000 passengers and 23,994 tons of freight—the latter doubtless an error to a very large amount, probably as much as two ciphers. The increase over the business of the previous year was 25 per cent. in passengers and 77 per cent. in freight. The earnings meanwhile were $1,137,240 from passengers and $3,673,657 from freight—an increase of 13⅔ per cent. in passenger and of 2 per cent. in freight earnings. The earnings from all sources were $5,520,611, which is 6¾ per cent. more than in 1899. The working expenses meanwhile were $4,825,496, which is 87½ per cent. of the gross earnings and 12 per cent. more than in 1899, so that the net earnings decreased from $860,860 to $695,116. The enterprise must not be judged by these returns, however. The passenger traffic is probably carried at a considerable loss; the freight at present probably consists chiefly of materials for the extension of the road and supplies for the forces working on it—that is for the eight months covered by this report, since which time it has been largely a military railroad. The steam ferries over Lake Baikal in the period from April 24 to Dec. 29 last year transferred 250 passenger cars and 11,119 freight cars across the lake. The larger ferryboat broke her propeller while working through the ice Dec. 29, and the smaller one is not powerful enough to get through the ice alone, but must follow in the wake of the larger one.

The traffic manager who would provide for the requirements of the country which his road serves must not only open his eyes but keep them open; for these requirements change with painful rapidity sometimes in this country. For instance, in 1893 nearly 88,000,000 lbs. of wool—29 per cent. of the entire clip of the country—was produced in the five states of New York, Pennsylvania, Ohio, Michigan and Texas; but in 1900 their clip of wool was but 49,000,000. Texas alone produced 30,000,000 in 1893, and not half as much in 1900. On the other hand, Montana, Wyoming, Colorado, Arizona and Utah, together clipped 54,000,000 lbs. in 1893 and 84,000,000 in 1900. Generally the districts where wool growing is a comparatively old industry, including California and New Mexico, have reduced their flocks, and the mountain districts where there was much land fit for little else have increased theirs. Montana is now the leading wool growing state, followed by Wyoming and Idaho, while Texas and California, eight years ago first and second, are now seventh and ninth.

Memphis was created by the river trade, receiving cotton not only from the Mississippi landings, but from the White, the St. Francis and the Arkansas, in days when there was no other than river transportation from Arkansas, which lasted for most of that state until a comparatively recent time. But things have changed. In the last crop year (ending Aug. 31, 1900) Memphis received 596,945 bales of cotton, of which 94,863, or less than one-sixth, came by river. A single railroad, the Yazoo Valley line, brought 163,288 bales. As to shipments, the river can hardly be called a competitor of the railroads, only 8,577 bales, or 1⅛ per cent. of the total, having gone by steamboats in that year.

James F. Goddard.

Mr. J. F. Goddard, Commissioner of the Trunk Line Association, died suddenly of pneumonia May 13, at his home in Brooklyn, N. Y. Mr. Goddard was born Jan. 28, 1842, in Brockton, Mass. Until 1890 his railroad career was in the West. He began as a clerk in the freight office of the Chicago, Burlington & Quincy in 1868, becoming Assistant General Freight Agent in 1872. This position he resigned in 1874 to become General Freight Agent of the Hannibal & St. Joseph, returning the next year to the Burlington as Assistant General Freight Agent. Three years later he became General Freight Agent of the Atchison, Topeka & Santa Fe, with which company he remained 12 years. In 1882 he was appointed Traffic Manager, then Assistant General Manager and in May, 1887, was made General Manager. For two years (1888-1890) Mr. Goddard was Third Vice-President of this company and Manager of the Chicago, Santa Fe & California. In 1890 he resigned to become Chairman of the Western Passenger Association, but after only six months in this position he was called to New York to become Commissioner of the Trunk Line Association, succeeding Mr. Fink. He has held this position ever since. In 1896 he was made one of the arbitrators of the Joint Traffic Association and continued such during the life of that association, although, in consequence of the uncertainty as to how long that organization would last, and the probability that the arbitrators' duties would be light, he continued to perform the duties of Commissioner of the Trunk Line Association.

The death of Mr. Goddard is a great loss to the railroad world. His long experience in both the traffic and operating departments had given him an unusual fund of knowledge, and this knowledge was always used to the best purpose. He had the judicial temperament, in a high degree, and his firmness of character was equalled only by the great kindliness and consideration with which he expressed his decisions, when firmness was required in uttering them. His personal integrity was of the highest, and this fact was generally recognized, as was evidenced by his selection to fill the place of Mr. Fink, and later by his appointment on the Joint Traffic Association Board. He was selected for this place after but little discussion, and, indeed, would have been satisfactory to many of the members as sole arbitrator. It always looked as though the other two members were put on as a matter of form. Mr. Goddard was extremely modest and seldom wrote or addressed the public in any way. He was very talkative with the reporters, and when he did answer their questions he usually found it necessary to take what is called the "railroad side" of traffic questions; but "interviews" of this kind, giving apparently partisan views, did not truly represent the man, for he was broad-minded and generous; and, as we have already said, the railroad world suffers a serious loss by his death. The circle of those who mourn the loss of a congenial business associate can hardly be larger than that of those who feel that they have lost a personal friend; for the latter circle includes all the members of the former whose relations with Mr. Goddard were at all intimate.

NEW PUBLICATIONS.

Boston Water Supply. Sixth Annual Report of the Metropolitan Water Board, Jan. 1, 1901. William N. Davenport, Secretary, 1 Ashburton Place, Boston.

We can do little more than call attention to the fact that this report is issued. It is an octavo volume of 274 pages, the greater part of which is the report of the Chief Engineer, Mr. F. P. Stearns. Appendices give itemized data of contracts, tabulations of cement tests, rainfall data, statistics of performance of pumps, water consumption, etc.

The work of the greatest magnitude on which the Board is now engaged is the building of the Wachusett dam and reservoir. Last August plans and specifications of the dam were completed and proposals called for, but because of drought and rapid increase of consumption it was thought important to put the work under way even before contracts were let, and excavation was begun by day labor. In the middle of October contracts were let, the contractors taking up the work where the day force stopped. The contract for the dam was let to McArthur Brothers, of Chicago, the lowest of 11 bidders, and amounts to $1,603,635. Considerable water will be stored in the spring of 1903 and the entire contract will be completed in November, 1904. The main dam will be about 800 ft. long with a total height of 200 ft. It will be carried about 20 ft. above the water line; therefore the height from the lowest point of excavation to the water line is about 179 ft. The dam will be 176 ft. thick at the foot and 25 at the water line. A detailed description is given in the report of the Chief Engineer.

The reservoir is another great undertaking. Before 1900 something like 600,000 cu. yds. had been removed and 458 acres of land stripped; in 1900, 1,678,000 cu. yds. was removed and 900 acres stripped. There is left to be removed nearly 4,000,000 cu. yds. and about 2,842 acres to be stripped, and existing contracts provide for about one-half of this work.

Another important work is the Weston aqueduct and reservoir. This aqueduct will have a capacity of 300 million gallons per day. It will have five tunnels, aggregating 12,000 ft. long, and the entire length of the masonry aqueduct will be 13.4 miles. The cost of the aqueduct, reservoir and pipe lines first required will be about $5,000,000, and this work will be accomplished in three years.

Since the Board was organized in 1895 the capacity of the waterworks of the Metropolitan Water District has been increased from 48 million gallons to 110 million gallons per day; the capacity of storage reservoirs has been nearly doubled. The total spent by the Board, exclusive of maintenance, amounts to $20,027,000, and the total cost of constructing the Metropolitan Water Works will amount to about $40,000,000.

Tunneling. A Practical Treatise. By Charles Prelini, C. E., with Additions by Charles S. Hill, C. E. Octavo, 312 pp., 150 illustrations, index. New York: D. Van Nostrand Company, 1901. Price, $3.00.

It is quite true that a modern book on tunneling is needed. Drinker's book is classical, and doubtless will be so for many years; but great advances have been made since it was written. The first edition of Simms' treatise was brought out some 55 years ago, but has been revised and added to by D. K. Clark in various editions, the last of which was published in 1896 (*Railroad Gazette*, 1897, p. 294); but these additions are not very systematic, nor do they cover the most recent practice in the sort of tunnel that most engineers will have to build if they build any. Nor does this latest book by Mr. Prelini fill the vacant place very fully. It reviews the field of recent work with reasonable completeness, so far as the number of examples selected goes, but rather superficially; and generally speaking, it is not unjust to say that the work is elementary. Yet it would be unjust to stop there, for the author has made a really useful review, giving numerous references to examples which the student can follow further in more complete descriptions, and giving also, at considerable length, descriptions of a few great modern tunnels, and accounts of the most recent shield work, with drawings of the shields. There are a number of tables of dimensions, cost and rate of progress. On the whole, it is quite safe to say that the volume is worth all that it costs to the engineer who has to do with tunnels, or who wants to know about tunnels merely as a part of his general professional knowledge. Finally, the book is uncommonly well printed.

Moody's Manual of Industrial and Miscellaneous Securities. New York: John Moody & Co., 35 Nassau street.

The first edition of this Manual appeared several months ago and a new edition is now in preparation. The first edition is an octavo volume of 1,108 pages. It gives membership lists of the stock exchanges of New York, Philadelphia, Boston and Chicago; a brief description of the financial and other important institutions in the City of New York, and the bulk of the volume is made up of short descriptions of industrial companies, manufacturing, mining, water and water power, telephone, telegraph and cable companies, companies making food products and miscellaneous corporations. The corporation laws of New Jersey, Delaware, West Virginia and New York are described. The descriptions of the various companies give short histories, capacity, capitalization, officers and directors. Altogether the volume is convenient and useful.

Traction and Transmission.—We mentioned recently the fact that the proprietors of *Engineering* (London) are starting a new monthly journal to be called *Traction and Transmission.* The first issue is received. It is a quarto (10 x 12 in.) of 56 pages besides numerous inserted plates, and is a handsome publication, printed on thick paper with large type. The table of contents includes some 16 articles on various phases of electric traction. The office of this journal is at 35 and 36 Bedford street, Strand, London, W. C.

TRADE CATALOGUES.

Locomotive Inspirators.—The Hancock Inspirator Company, 85-89 Liberty street, New York City, sends a new catalogue, being a quarto of 44 pages, with a cover. It is a handsome pamphlet as to typography and press work. The pamphlet shows the Hancock inspirators and locomotive injectors with attachments. Tables are given showing the steam range and the capacities at different steam pressures. The inspirator works from 35 lbs. to 300 lbs. steam pressure without any adjustment and will take feedwater at 125 deg. F., with capacity increasing as the steam pressure increases. Besides the price lists the tables give capacity and sizes of pipe connections and sizes of steam valves, check valves and suction hose. A new article now illustrated for the first time is the Hancock double check valve made without stop valve or with stop valve and adapted to the backhead of the boiler.

Chicago Portland Cement.—The Garden City Sand Company, Security Building, Chicago, issues a pamphlet designed to advertise the Chicago Portland cement. This is made at Oglesby, Ill., where the Chicago Portland Cement Company has a plant capable of turning out 400,000 bbls. a year. The buildings and power are designed for an increase of 50 per cent. over that. The pamphlet describes briefly the process and gives certain instructions for using Portland cement, while the bulk of it is made up of letters from engineers and contractors who have used this brand, together with illustrations of buildings and various masonry structures into which it has gone.

TECHNICAL.

Manufacturing and Business.

The Caswell Car & Improvement Co. has moved its offices to 930 Monadnock Building, Chicago, and Mr. A. J. Witherell has been made Secretary of the Company.

The Stanley Electric Mfg. Co., of Pittsfield, Mass., has established a branch sales office at 26 South Fifteenth street, Philadelphia, Pa., in charge of James E. Cutler, District Manager, late of the New York office of the company.

H. J. Davis, for a number of years in charge of the New York office of the Dickson Locomotive Works, has resigned to manage the Eastern office of Fitz-Hugh & Co., Chicago, dealers in railroad supplies. Mr. Davis' office will be at 141 Broadway.

Harry A. Norton, representing A. O. Norton, Boston, Mass., sailed from Boston last week for an extensive trip abroad. He will visit the various agencies for the Norton ball-bearing lifting jacks in France, Germany, Italy, Russia and Sweden.

The Bullock-Wagner Sales Organization has established a District Office at 1624 Marquette Building, Chicago, in charge of H. B. Foster, who was for the past two years Sales Agent of the Wagner Electric Co. E. W. Goldschmidt, formerly with the Western Electric Co., has been made assistant to Mr. Foster.

The American Blower Co., of Detroit, Mich., is furnishing the heating apparatus for the half million dollar plant of the Natural Food Co. at Niagara Falls, and has just secured the contract for the new plant of the General Electric Co., at Birmingham, England.

The Melan Arch Construction Co., of New York, and Mr. Edwin Thacher, Consulting Engineer and Contractor, have united their business under the name of the Concrete-Steel Engineering Company, with offices in the Park Row Building, New York City. They are prepared to furnish plans, specifications and estimates for concrete-steel construction of all kinds, also for foundations and other like work.

Iron and Steel.

Percival Roberts has resigned as President, and Chas. Macdonald has resigned as First Vice-President, of the American Bridge Co.

J. C. Whitney, Water Commissioner of Newton, Mass., wants bids, until May 27, at noon, for building a concrete and steel covering for the reservoir on Waban Hill in Newton.

Rails for 30 miles of road for the Indianapolis & Martinsville Rapid Transit Co., we are told, will soon be wanted. Charles Finley Smith is President, Indianapolis, Ind.

The Delaval Steam Turbine Co., with a capital stock of $1,000,000, was incorporated in New Jersey, May 8, to make steam turbines and electrical apparatus. A plant is being built at Trenton, N. J.

The Kansas City & St. Joseph Electric R. R. Co. is in the market for 5,000 tons of 70-lb. or 75-lb. T-rail, to be delivered by Oct. 1. The company's address is New York Life Bldg., Kansas City, Mo.

The National Tube Co. has contracted with the Republic Iron & Steel Co. for about 25,000 tons of plates which will be rolled at the Valley Works of the Republic Iron & Steel Co. in Youngstown.

The directors of the Tennessee Coal, Iron & Railroad Co. have made arrangements for refunding all its bonded debt and for an issue of $5,000,000 additional bonds, of which only $3,000,000 will be placed on the market. The money will be devoted to building a rail mill.

Continuous Brakes in France.

The French State Railroad System is now building 100 20-ton freight cars which will be equipped with continuous brakes. The same System proposes to order 200 more to be so equipped. The Westinghouse is doubtless the brake used.

Isthmian Canals.

The final report of the Isthmian Canal Commission, of which Admiral J. G. Walker, U. S. N., is Chairman, will probably be ready for submission to the President in about six weeks. The last party of engineers is about leaving Nicaragua.

Baldwin Compound Locomotive for Pike's Peak.

There is now in the Baldwin Locomotive Works, just about completed, a locomotive for the Manitou & Pike's Peak Railway. This locomotive has Vauclain compound cylinders and plate frames and is practically a duplicate of those locomotives which Mr. Vauclain designed for this railroad several years ago.

The Algiers Dry Dock.

The steel floating dry dock for Algiers, La., is almost completed, and some time between June and August it will be towed from Baltimore, Md., to Algiers by several large tugs. The dock is 525 ft. long, 100 ft. wide across the entrance, 28 ft. deep over the sill, with a lifting capacity of 15,000 tons, or 18,000 tons in an emergency. The dock cost $810,000.

Locomotives and Rolling Stock—Russia.

According to the *Journal de St. Petersburg*, the Russian Minister of Roads and Transportation has allowed the Government railroads the following sums for 1901:

For locomotives	$10,300,000
For freight cars	9,270,000
For passenger cars	3,605,000
Total	$23,175,000

Improvements at the Schenectady Locomotive Works.

In our issue of Oct. 5, 1900, we noted the progress made in building the central electric power station at the Schenectady Locomotive Works. This work is now well advanced and the engineering department has for some time been engaged in designing two very large buildings for a new blacksmith shop and a new hammer shop. The buildings are now being put up, and with their equipment of modern tools will add materially to the facilities of the works.

A Power Station for Electrolytic Work.

A contract recently given by the Castner Electrolytic Alkali Company, of Niagara Falls, N. Y., to the Stanley Electric Mfg. Co., of Pittsfield, Mass., will include eight S. K. C. motor generators, each having a capacity of 500 kilowatts of direct current output; the machines to take current from the Niagara Falls Power Company's plant, at 2,200 volts of 25 cycles and convert it into direct current of 245 volts for the electrolytic work of the Alkali Company. The contract also provides for an entire switchboard equipment to take care of 8,500 kilowatts.

A German Impression of American Engines.

German newspapers, having before discussed the arrival of two heavy American freight locomotives for the Bavarian State Railroads, later announce the coming of an express locomotive for the same lines from the Baldwin Works. It is reported that its outward appearance makes a very favorable impression. Especial attention is given to "the practical, ingenious arrangement of the four cylinders, of the Vauclain compound type, and the simple and solid frame." The locomotive is a 10-wheeler with four drivers. It is claimed to be able to haul an ordinary train 73 miles an hour (120 km.).

The Manhattan Terminal of the Brooklyn Bridge.

Chapter 712, Section 1, of the laws of 1901 of the State of New York is what is known as the McCarren bill and is intended to bring about an improvement of the Manhattan terminal of the New York & Brooklyn Bridge. Under that act the Commissioner of Bridges (Mr. John L. Shea) is authorized to prepare plans and specifications for the reconstruction of that terminal. He is authorized to employ engineers to advise him in the preparation of such plans, specifications and location. Under this act a board of three engineers has been appointed, consisting of Messrs. T. C. Clarke, A. P. Boller and H. G. Prout.

Torpedo Craft.

The torpedo boat destroyers, "Truxton," "Whipple" and "Worden," building at the yards of the Maryland Steel Co., at Sparrow Point, Md., will be launched on Decoration Day, May 30. All these boats are built of steel, with displacement of 433 tons, twin screws, and 8,300 i. h. p. The torpedo boat "Shubrick," built by the Wm. R. Trigg Co., Richmond, Va., maintained a speed of 26.7 knots for two consecutive hours on her trial trip, and the Naval Board of Inspection has reported the boat favorably to the Navy Department. The "Shubrick" has twin screws, 165 tons displacement and 3,000 i. h. p.

Bids for River and Harbor Works.

Bids are asked until June 24 for dredging the entrance to Pearl Harbor, Oahu, Hawaiian Islands. Lieutenant-Colonel W. H. Heuer, United States Engineer, San Francisco, Cal., has the matter in hand.

Bids will be received by Major Wm. H. Bixby, Corps Engineers, U. S. A., Cincinnati, Ohio, June 4, for constructing 500 ft. of chanoine dam of navigable pass at Dam No. 4, Ohio River. Wm. Martin, Resident Engineer, Davis Island Dam, Bellevue, Pa., may be addressed.

Bids are wanted May 30 for dredging 56,000 cu. yds. material for improving Clatskanie River, Ore. Captain W. C. Langfitt, Corps Engineers, U. S. A., Portland, Ore.

Steel Transfer Boat for the Q. & C.

The Cincinnati, New Orleans, Texas & Pacific Ry. will soon receive bids on a new transfer boat for traffic between Vicksburg, Miss., and Delta, La. (a car ferry across the Mississippi). The new boat will be of steel and will be 303 ft. long over all, and 290 ft. between perpendiculars. The moulded beam will be 52½ ft., and the depth of hold 7 ft. 9 in.

The boat will be a side-wheeler, the engines 26 in. in diam. and 10 ft. stroke, with two batteries of three boilers each, of the usual type of boiler used on the Mississippi River. The steam pressure will be 170 lbs. There is to be two tracks running from bow to stern on box girders, with a capacity of 16 cars. The boat will have steam capstans and other modern equipment.

Hall Signals in England.

Mr. H. Raynar Wilson, recently Signal Engineer of the Lancashire & Yorkshire Railway, has resigned and will go into business on his own account as a dealer in a few selected railroad specialties. He has just made a visit to this country and sailed from New York last week on his return to England, having made arrangements to exploit the Hall automatic block signals in Great Britain. He is a high authority in signaling, having had long experience on the busiest road in England, and having for many years had charge of that class of writing for the *Railway Engineer*, of London. He has recently published a valuable book on the subject. He would be glad to hear from Americans who have devices in the signaling field, or connected with track, which they would like to present to British users.

Tonnage Rating on the New York Central.

The New York Central & Hudson River Railroad is starting in to systematically establish a tonnage rating for all classes of locomotives, on the different divisions of the road, with a view to loading the engines more nearly to their capacity. It is the intention to formulate definite rules for limiting the trainload to the condition of track as affected by wind and weather, and also to take into consideration the bettered condition of locomotives after they have been shopped. This work will, of course, take considerable time and when it is done we shall be able to give some definite information as to methods used. The preliminary work is being done by Mr. F. M. Whyte, Mechanical Engineer, and Trainmaster Burnett. A dynamometer car belonging to the Canadian Pacific is being used in the tests that are now being made.

Special Link Belt Elevating Machinery.

One of the many ingenious applications of link belt machinery is to hoisting empty boxes as installed for the Scott Paper Company at Philadelphia. A double strand of Ewart link belting is used and at intervals of 5 ft. a straight arm is attached to each belt. These arms receive the empty boxes, which are carried to the top of the warehouse at the rate of 12 per minute. Another application of the same principle is for elevating barrels and sacks, as, for instance, in the Jersey City freight house of the Lehigh Valley Railroad. The machine there installed has heavy malleable iron chains with carry arms every 10 ft. The barrels are discharged by means of an adjustable stop at such height as to be rolled away on the floor, or the sacks for convenient removal by hand trucks. The head is driven by worm gearing encased in a housing, and the worm runs in a bath of oil.

The Harbor Works of Rosario.

A great contract is to be let by the Government of the Argentine Republic for building and operating harbor works at Rosario. The bids are to be received at the Legation of the Argentine Republic in London until Dec. 10, 1901, and at the office of the Minister of Public Works, Buenos Ayres, until Jan. 10, 1902. On this last day the bids will be opened in the presence of the bidders. The contract is to be executed within two months after the acceptance of the terms. The work is to be begun within four months and is to be completed within five years. Bids are to be received for construction and operation of the harbor, the work to be paid for by the receipts of the operation; or bids will be received for construction only, without operation. Full particulars of this work with maps, charts and tables showing the results of elaborate studies, may be seen in the office of the *Railroad Gazette*.

Rail Top Culverts on the St. Paul.

The Chicago, Milwaukee & St. Paul Railway has built in recent years quite a number of rail top culverts. These are built for spans varying from 5 ft. to 12 ft. in the clear. For larger openings two culverts are sometimes used with a common pier between them. These are called double rail-top culverts. When the span exceeds 12 ft. in the clear an I-beam deck is used instead of rails. For openings smaller than 5 ft. wooden box culverts or cast iron pipe culverts are used, the plan being to draw an iron pipe through the culvert when the wooden box has outlived its usefulness. These rail-top culverts have been built under banks varying from 2 ft. 6 in. to more than 50 ft. from top of culvert to base of rail. Formerly they were mostly built with rubble masonry walls and a concrete cover over the rails; of late years they have been built entirely of concrete. A dscription of this work in some detail may be found in the February issue of the *Journal* of the Western Society of Engineers.

Rogers Locomotive Works.

The Rogers Locomotive Works have been incorporated under the laws of New Jersey to take over and operate the plant of the old Rogers Locomotive Co., at Paterson, N. J. The nominal capital stock is $125,000, but when the organization of the new company is perfected this will be increased to $1,600,000, of which one-half will be preferred and one-half common stock. The incorporators are: Charles A. Stover, Frank A. Branda and Thomas R. Evans. The Board of Directors will consist of seven or nine members, which, together with the officers, will be elected in a few days—possibly to-day (Friday). George E. Hannah, Treasurer, and Reuben Wells, Superintendent, of the former company, will be retained. Among those identified with the new Rogers Locomotive Works are: E. H. Norton & Co., bankers, and Elliott C. Smith, 33 Wall street, New York; Frank P. Holran, 27 William street, New York; Robert C. Pruyn, President National Commercial Bank, Albany, N. Y.; Stephen Peabody, 36 Wall street, New York; Lawrence Turnura & Co., bankers, 50 Wall street, New York, and J. B. M. Grosvenor, 66 Beaver street, New York. Mr. Grosvenor was for many years interested with Mr. Rogers, principal owner of the Rogers Locomotive Co. The company has an order for 30 large engines for the Great Northern, and bids have been submitted on engines for other roads here and in Europe. The works will be started in 10 days.

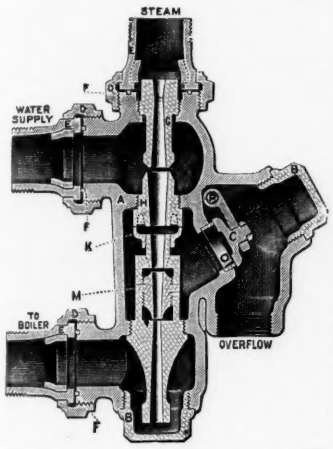
Locomotive Builders' Consolidation.

Last week we referred briefly to press despatches which contained varying statements about a proposed consolidation of the locomotive works in this country. The facts at the time of going to press this week were as follows: The Cooke Locomotive & Machine Works, Paterson, N. J., have been bought by the International Power Company (owners of the Rhode Island Locomotive Works) and the formal transfer will be made June 10, provided all terms of the contract are complied with. A company to be known as the American Locomotive Company will be incorporated with a capital stock of $50,000,000,

to take over the following works: Brooks Locomotive Works, Dunkirk, N. Y.; International Power Company (works at Paterson and Providence, R. I.); Manchester Locomotive Works, Manchester, N. H.; Pittsburgh Locomotive & Car Works, Pittsburgh, Pa.; Richmond Locomotive Works, Richmond, Va., and Schenectady Locomotive Works, Schenectady, N. Y. Options on these plants have been secured, based on cash payments; and if no unforeseen obstacles arise after the auditors have finished their work, the consolidation will go into effect July 10. At the present time the following builders have not decided to enter the combination: Baldwin Locomotive Works, Philadelphia, Pa.; Climax Mfg. Co., Corry, Pa.; Dickson Locomotive Works, Scranton, Pa.; Lima Locomotive & Machine Works, Lima, Ohio; The H. K. Porter Co., Pittsburgh, Pa.; Rogers Locomotive Works, Paterson, N. J., and Stearns Mfg. Co., Erie, Pa. The capacity of the works to be consolidated, according to the output of all the builders for the year 1900, will be something more than 44 per cent. of the total capacity of all the locomotive builders. The largest individual locomotive works in this country is the Baldwin Locomotive Works, the capacity of which is equal to about 38 per cent. the entire capacity of all the works. The Climax Mfg. Co., Lima Locomotive & Machine Works and Stearns Mfg. Co. build only geared locomotives, and the H. K. Porter Co. light locomotives.

The Lunkenheimer Automatic Injector.

The injector here illustrated, as made by the Lunkenheimer Company, of Cincinnati, is absolutely automatic and has the great advantage of automatically restarting after a break has occurred from interruption of either steam or water. The simple design and substantial make of parts are features to which attention is directed. The areas of the body are ample and the tubes are all screwed in place and do not depend upon pipe unions for retainment in place. Following are some figures from actual tests in lifting feedwater at a temperature of 75 deg.: Lifting 2 to 4 ft., steam pressure 20 to 180 lbs.; 4 to 8 ft., steam pressure 25 to 165 lbs.; 8 to 12 ft., pressure 30 to 140 lbs.; 12 to 16 ft., pressure 50 to 120 lbs.; 16 to 18 ft., pressure 60 to 100 lbs.; 18 to 20 ft., pressure 70 to 90 lbs. Tests have shown that with steam pressure ranging from 60 to 100 lbs., and feedwater at 75 deg. F., the discharge can be graded through a range of 50 per cent. When lifting feedwater 3 ft. at steam pressures from 45 to 100 lbs., the temperature of the feedwater may be allowed to reach 125 deg. F.



THE SCRAP HEAP.

Notes.

Newspaper accounts say that the Atchison has advanced the pay of all its machinists about 10 per cent. (to 30 and 31 cents an hour); and that a similar increase has been agreed to on the Illinois Central.

A Des Moines paper says that the Chicago, Milwaukee & St. Paul has notified its employees that hereafter passes will not be issued to them for their families, nor any to themselves except when going on the company's business.

The Legislature of Tennessee has repealed the law, Section 33, Chapter 5, 1897, empowering the State Railroad Commission to suspend the long and short haul law. This law (Section 18) is now rigid, with no exceptions, and the penalty for disobedience is a fine of $100 to $500.

According to the *Los Angeles Times* the railroads have brought to that city during the past 12 months 512 persons or parties occupying private cars; in other words, there came to the city 270 such cars over the Southern Pacific and 242 over the Atchison. The ownership of these cars was about equally divided between railroads and private individuals.

The Police Department of the New York Central, in its last annual report, shows that 2,300 men have been arrested on the premises of the company, of whom 1,700 were sent to prison for terms of one to six months. The Chief of the Police Department now has four assistants, in charge of four districts; with headquarters respectively at Poughkeepsie, Albany, Buffalo and Oswego.

The Supreme Court of the State of Michigan has issued a peremptory writ ordering the Wabash Railroad to comply with the order of the Commissioner of Railroads, and carry passengers in that state at the rate of 2½ cents a mile, which is the rate fixed by law upon the basis of the passenger income of that company for the year 1899. The law under which the action was taken was recently upheld by the court in an opinion given and this order is to compel the company to comply with its terms. Since the issuance of this order the report of the company for the year 1900 has been issued, showing that under the law the rate must be still further reduced, to 2 cents a mile, and a notice to this effect has been given by the Commissioner. It is probable that no further legal action will be required. All the points were fully covered in the original case, and it is thought that the last reduction will be made without the necessity of any action being begun.

Traffic Notes.

The Boston & Maine now sells 500-mile tickets, good for bearer, for use on the lines of the company in Massachusetts, for $10 each.

Messrs. Bird, of the St. Paul, and Felton, of the Alton, have resigned their positions as Chairmen of the district committees (Omaha and Kansas City) which were formed several months ago for the purpose of controlling freight rates. The results of the work of these committees do not appear to be very satisfactory. The work, such as there is, for all of the districts, will be left in charge of Mr. Ristine.

St. Louis and Chicago papers say that the action of the Wabash in cutting passenger rates from Kansas City eastward, in its endeavor to maintain its differential, is spreading in mischievous effect. Intermediate rates are now affected. The Chicago Great Western's latest reduction in meeting the competition of the former has unsettled the rate from Des Moines, so that the Rock Island has found it necessary to make reductions in rates from that point.

An Officers' Handbook.

The "Handbook" of the Southern Railway, which has recently been revised, embraces information on no less than 33 subjects, the matter filling 100 pages. These subjects, as enumerated in the index, are as follows: List of cars and engines (10 pages); Cars equipped with steam heat, with name of apparatus on each car; Coaling stations, with capacity in tons; Cotton compresses; Connections with other roads (there are 61 connections with three roads, A. C. L., L. & N., S. A. L.); County seats, on what road or how reached; Divisional junction points, showing which superintendent has charge; Floating equipment; Hospital districts (boundaries); Laws governing transportation of live stock; Limits for loading cars, width and height on each division; Mail routes, as arranged by the postoffice department; Runs of mail cars; Medical directions ("First aid to the Injured"); Official basis for engine, train and car mileage; Private cars and description; Regulations for handling law papers, and claims for animals killed or injured; Rules for employing company's surgeons, and other surgeons in emergencies; Rules governing loading of long lumber, etc., on open cars (13 pages); Stock pens and chutes, with capacity of pens in carloads; Stretchers, location of, arranged alphabetically by towns; Subdivisions of road; Sunday laws (four states); List of surgeons, arranged alphabetically by towns; Tracks and terminals operated jointly (three pages of this matter); Track scales (of which there are over 150); Turntables and Ys, with lengths of tables, distance which it is necessary to travel to turn passenger cars, and the time required; Twenty-eight hour law for live stock; Watch inspectors (46 of them); Water tanks, showing capacity in gallons; Rules for weighing bulk freight, for handling cotton, and for the prevention of fire.

Elberfeld-Barmen Suspension Railroad.

Under date of March 4, Consul-General Guenther, of Frankfort, reports that, on the 1st the suspension railroad across the valley of the River Wipper, from Elberfeld to Barmen, was opened for passenger traffic. The surface railroad makes the trip in twenty-five minutes, while the suspension railroad accomplishes it in half the time, and it is contemplated to still further increase the speed. The fare is 10 pfennigs (2.38 cents).

Winter Railroading in Russia.

Southwestern Russia had an "old-fashioned" snow storm last winter, in which travelers were accumulated and held so long at certain small stations that it was very difficult to get food enough for them. At one station there were 2,000 passengers, waiting to be forwarded, and 3,000 laborers engaged in digging out the road. In some places the snow was 30 ft. deep. Still worse was the condition of passengers in trains snowed in between stations, who came near death by freezing and starving. Regular rescue expeditions with sledge trains were fitted out, provided with provisions, wraps, overshoes, etc., and sent in search of the stalled trains, whose passengers were usually carried by them to Odessa. All this was about in the latitude of Paris and Vienna. Snow is common there, but the storm of last January was unprecedented since the days of railroads.

A "Limited" From Berlin to Lucerne.

This year for the first time a limited express is to run from Berlin by way of Frankfort-on-Main to Lucerne in Switzerland. Between Berlin and Frankfort it will be the fastest train on the route, making the distance in five minutes less than eight hours. At Frankfort will be added cars coming from The Hague and Amsterdam. Leaving Berlin at 3:40 p. m. and Amsterdam at 2 p. m., the passenger will arrive at Lucerne at 8 a. m. Returning the train will leave Lucerne about 11 p. m. and reach Frankfort at 8:50 a. m., which will thus be situated as to Switzerland very much as New York is to the Adirondacks and the White Mountains.

Washington Filtration Plant.

The Board of Engineer Officers appointed to select a site for the new filtration plant for Washington, D. C., has made its report which has been approved by the Chief of Engineers. The land selected lies just west of East Capitol street, and south of the Soldiers' Home grounds, with the Howard University reservoir on the west and south of it, and contains 45 acres, the price paid being about $450,000.

The Gathman Gun.

Arrangements are being made at Washington for a test this summer of the Gathman gun, the test to be made by a Board of Army and Naval Officers. The Bureau of Construction of the Navy is preparing plans for a target to simulate the side of a battleship. It is to be faced with armor plates 12 in. thick. Two targets will be used.

The Engineer's Work in Ventilation.

In a recent article Prof. S. H. Woodbridge, of the Massachusetts Institute of Technology, says, "as an applied science, ventilation involves the movement of air through supply and discharge conduits, and either such effective diffusion of air within enclosures as to furnish air to and remove impurities from all their parts, or else such concentration of air movement as shall prevent the diffusion of impurities locally produced, and as shall effect their removal without diffusion through the enclosures. So considered, ventilation is a department of mechanics and mechanical engineering, a distinctly technical field. Without technical knowledge training, the questions of simple mechanics which are involved in such problems become mysterious in theory and vagaries in practice, and results become a matter of chance rather than of precision. Ventilation deals with air, an invisible substance; with vitiation, and invisible impurity; with unseen motions; with motive forces often intangible; with courses of motion which are limited within invisible bounds. The field is a wide one for the play of fantasy in its mild and in its most erratic form. The capricious art can become an established science only in the hands of those who are too well grounded in the fundamental principles of ventilation involved to make it possible for them to entertain any theory, advance any explanation, or advocate any practice in matters of ventilation which is not clearly based on the demonstrable laws and well-known phenomena of the mechanics of gases, all of which demands a technical training of no mean order."

Electric Plants for India.

Besides Lahore, which has a population of about 200,000, the following large cities of India have no electric plants: Madras, 260,000; Delhi, 115,000; Lucknow, 150,000; Allahabad, 100,000; Agra, 200,000; Cawnpore, 120,000; and Benares, 225,000. Madras, it is true, has one for tramways, but not for lighting. Electric lighting, though only introduced into Calcutta last year, is coming into general use. A contract has also been let for changing the tramways from horse to electric power. Bombay, with a population of 750,000, has no electric light plant, and the tramways are operated by horsepower. Mr. Arthur Gray, barrister, and Mr. F. C. Remington, Bombay Tramway Company, are negotiating with the Lahore municipal committee for a concession of the monopoly of the supply of electric light and power within the municipal limits, for 30 years, on the general lines of the Calcutta concession. Their proposals also include an electric tramway line between the city and the railroad station, with a possible extension to Mian Mir.

Cart-Road Concession in Nicaragua.

Mr. E. W. Perry, in behalf of a United States syndicate, has secured a contract from the Government of Nicaragua, to construct three cart roads, leading, respectively, from Matagalpa, Nueva Segovia and the Pis-Pis mines, in the Cabo Gracias district, to the head of steamboat navigation on the River Coco Wanks or Segovia. The roads are to be completed and delivered five years from the date of ratification by the Nicaraguan Congress. In payment, the Government of Nicaragua will grant alternate lots, two kilometers square, of public lands continguous to the proposed routes. This syndicate has just purchased the exclusive right to navigate the Coco Wanks, and, in order to place its steamer service on a paying basis, will build these roads to bring down to the river the products of that section of the country. The Coco Wanks is the largest stream in Nicaragua, being navigable to a series of rapids 160 miles from its mouth, at which point the cart roads will converge.

Official Thieves in Russia.

Systematic cheating in freight shipments has been detected on a number of railroads in Western Russia, which must have been the result of conspiracy involving many employees and some high-placed ones. The State Railroad management is said to have ascertained losses of some $1,500,000. The plan was a simple one, to bill as full carloads much smaller quantities of freight from and to stations where there are no scales, and then require payment for goods lost in transit. Evidently, this could not be done often without arousing suspicion, and it is significant that the railroad management has dismissed one of its attorneys with his three assistants.

Tacoma-Liverpool Steamship Line.

The Bureau of Foreign Commerce has received from the Tacoma Chamber of Commerce and Board of Trade the announcement that a new line of steamers has been established to ply between Tacoma and Liverpool, via the Suez Canal, touching at Manila and other Philippine ports, all the Straits ports, and those of India, Arabia, Egypt, the Mediterranean, and the Continent. There are nine ships engaged in this line, with a tonnage varying from 4,000 to 11,000 tons.

Telford Premium for L. L. Buck.

The Institution of Civil Engineers (British) has awarded the Telford premium to Mr. L. L. Buck, M. Am. Soc. C.E., M. Inst. C.E., for a paper on the Niagara Falls and Clifton Steel Arch Bridge.

I. C. C. Decision on Fourth Section as Affecting San Bernardino.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision of the case of A. W. Holdzkom, of San Bernardino, Cal., against the Atchison, Topeka & Santa Fe and others. The complaint was that the defendants unlawfully charged more for the transportation of carriages from Jackson, Mich., to San Bernardino than for the longer distance from Jackson to Los Angeles. The Commission rules as follows:

The conditions affecting traffic, including carriages, from eastern points are rendered substantially different at Los Angeles from those at San Bernardino by the competition of carriers wholly by water from the Atlantic seaboard to Port Los Angeles, a point on the Pacific coast near Los Angeles, and the effect of such competition is properly recognized at Los Angeles by giving that city all rail rates from the east as low as those in effect to San Francisco, which also has the water competition.

No opinion is expressed as to whether rates from the east to San Bernardino made by combining the rates to Los Angeles with the locals back to San Bernardino can lawfully be constructed in that manner, the evidence being insufficient to enable the Commission to determine the question.

Mississippi River Commission.

Col. Amos Stickney, Corps of Engineers, U. S. Army, has been appointed President of the Mississippi River Commission, to succeed Gen. Gillespie, now Chief of Engineers. Lieut-Col. Henry M. Adams, Corps of Engineers, has also been appointed a member of the Commission. Col. Stickney has been attached to the Mississippi River Commission about 20 years. He is also President of the Missouri River Commission, and is stationed at St. Louis. Col. Adams is stationed at New Orleans in charge of river and harbor work in that vicinity, including the works at the entrances to the Mississippi River and at Sabine Pass, Texas.

A Big Casting at Thurlow.

On Friday, May 3, a heavy steel casting was made at the works of the American Steel Casting Company, Thurlow, Pa. The weight of metal in the melt was about 180,000 lbs. There were three heats, two from No. 1 foundry and one from No. 2 foundry, and the pouring occupied about 30 minutes. The casting is a pinion which will weigh 85,000 lbs. It is 9 ft. 6 in. in diam. with a 5 ft. face.

LOCOMOTIVE BUILDING.

The Mineral Range is reported to be in the market for six locomotives.

The Missouri Pacific, it is reported, has ordered 10 engines from the Brooks Locomotive Works.

The Macon, Dublin & Savannah is reported to have ordered three locomotives from Baldwin Locomotive Works.

The Colorado Springs & Cripple Creek District is having one engine built by the Schenectady Locomotive Works.

The Pere Marquette has ordered 10 locomotives from Brooks Locomotive Works in addition to the 10 recently ordered.

The Great Northern has ordered 30 locomotives from Rogers Locomotive Works, 20 from Brooks Locomotive Works and 10 from the Cooke Locomotive & Machine Co.

The Atchison, Topeka & Santa Fe is reported to have ordered a large number of locomotives from the International Power Co., some to be built at Providence and the balance at Paterson.

The Missouri, Kansas & Texas is about to place an additional order for five mogul locomotives. They will weigh 238,600 lbs., with 112,500 lbs. on the driving wheels, will have 19-in. x 26-in. cylinders and 57-in. driving wheels, with a working steam pressure of 190 lbs.; 236 tubes 2 in. in diam. and 11 ft. 8 in. long; fire-boxes 96 7-16 in. long and 42 in. wide; a tender capacity for 4,300 gals. of water and 10½ tons of coal. These are the same as the 17 now building at the Baldwin Locomotive Works ordered some time ago for September delivery.

CAR BUILDING.

The Metropolitan Elevated of Chicago is about to order 47 coaches.

The Erie is reported to be in the market for from 1,000 to 1,500 cars.

The Dayton & Union is having two coaches built by the Barney & Smith Car Co.

The San Pedro, Los Angeles & Salt Lake is in the market for 10 passenger cars.

The Chicago, Milwaukee & St. Paul has ordered four sleeping and two dining cars from the Pullman Co.

The Duluth, South Shore & Atlantic has ordered six passenger cars from the American Car & Foundry Co.

The Illinois Car & Equipment Co. has received an order for 100 tank cars for a private concern in Texas.

The Chesapeake & Ohio is in the market for 1,000 coal cars of 80,000 lbs. capacity, and is also reported in the market for box cars.

The Mexican Central is in the market for 100 stock and 100 box cars of 60,000 lbs. capacity, and 50 coal cars of 80,000 lbs. capacity.

The Rio Grande Western has ordered 50 standard distributing cars equipped with Westinghouse brakes and automatic vertical hook couplers from Rodger Ballast Car Co.

The Chicago Great Western is in the market for 800 box cars, 36 ft. long; 400 gondola cars, 34 ft. long; 500 flat cars, 40 ft. long, and 300 stock cars, 36 ft. long (all of 70,000 lbs. capacity), and a few passenger cars.

The Chicago & Eastern Illinois has ordered 16 four-wheel caboose cars from the Mt. Vernon Car Mfg. Co., as mentioned in our issue of May 3. The special equipment includes Tower couplers and Mt. Vernon wheels.

The Pere Marquette has ordered 100 gondola and 500 box cars of 60,000 lbs. capacity from the American Car & Foundry Co., for July delivery. They will measure 38 ft. long. The special equipment includes Pressed Steel bolsters, Westinghouse brakes, Fulton brasses, Tower couplers, Butler draft rigging, McCord journal boxes and box lids, Chicago roofs, Detroit springs and Fox trucks. The road also has asked bids on 200 furniture cars.

BRIDGE BUILDING.

Akron, Ohio.—We are told that bids are wanted at noon on May 25 by the Board of City Commissioners for a steel deck plate-girder bridge over the Ohio Canal at Cherry street. Only general plans and specifications are on file with City Engineer J. W. Payne. Bidders will make their own plans which must conform to the general plans on file.

The question of building a concrete bridge over Cuyahoga River, called the Cuyahoga street bridge, is again under consideration by the City Commissioners. We were recently told that the work would probably be authorized this summer. The cost is estimated at $9,000.

Ashland, Ky.—The War Department has approved the plans of the Ashland & Ironton Bridge Co., for a bridge over the Ohio River at Ashland. The bridge will be 1,825 ft. long, the channel span to be 750 ft. A. C. Campbell, of Ashland, is Secretary of the company.

Atlanta, Ga.—The Atlanta Rapid Transit Co., according to report, has offered to contribute $15,000 toward the cost of a viaduct proposed over Peters street, and for right to use it.

Boston, Mass.—The Committees on Metropolitan Affairs and Roads and Bridges have reported a bill for a new bridge across the Mystic River between Somerville and Medford. The bill authorized the Metropolitan Park Commission to build the bridge after the plans are approved by the County Commissioners of Middlesex. The cost is not to exceed $200,000.

Brighton, Colo.—The county will build a steel bridge over the Platte River at Brighton. It will be about 300 ft.

Brunswick, Md.—The county will soon let a contract for a 30-ft. iron bridge. Address the County Commissioners.

Buffalo, N. Y.—A bill has been signed by the Governor appropriating $25,000 for the bridge proposed over the Clark & Skinner Canal.

A bill apropriating $30,000 for a bridge over the Black Rock Harbor has been signed by the Governor. The plans for this structure, which is to be a drawbridge over the Ferry street crossing, were made by State Engineer Edward A. Bond.

Charlottetown, Prince Edward Island, Canada.—Surveys are reported made for the bridge proposed over the North River at Brighton. The extreme distance is 3,000 ft. H. C. MacMillan is the Government Engineer.

Chester, Mass.—The Selectmen are considering the advisability of replacing the Wait bridge with a new structure at a cost of $2,500. The Board is also considering the South bridge at a cost of $3,500.

Cohoes, N. Y.—The matter of building a viaduct over the D. & H. tracks on Ontario street is before the Council.

Coldwater, Mich.—The Council has authorized the Committee on Streets, Bridges and Water Courses to select a plan for an iron bridge on Sprague street and advertise for bids.

Denver, Colo.—Wm. P. Jones, Engineer of the Department of Public Works, has been directed by the Board to make plans and estimates for the West Colfax avenue viaduct. A year ago an estimate of $650,000 was made.

Dover, Del.—The Delaware General Electric Co., which is building a trolley railroad through the southern part of the state, has made an offer to the county to build all the bridges now in contemplation. This offer has caused the Levy Court to withhold the letting of the new bridge over Silver Lake near Dover, for which bids were opened on May 7.

Dubuque, Iowa.—Proposals are wanted, June 1, for building the substructure and the timber trestle approach for the highway bridge over the Mississippi for the Dubuque & Wisconsin Bridge Co. Plans may be seen at Dubuque or at the office of E. C. & R. M. Shankland, The Rookery, Chicago, Ill.

Hamilton, Ohio.—The County Commissioners have authorized an issue of $50,000 of bridge bonds, part of which will be expended as follows: Woodsdale bridge, $38,000; Dry Fork bridge, $6,500; Kyger farm bridge, $2,500, and the High bridge, California pike, Morgan township, $3,000.

Hoboken, N. J.—The New York Bay R. R. (Pennsylvania R. R.) will build a bridge over Avenue C.

Hondo, Texas.—The Commissioners of Medina County have been asked to issue bonds for a bridge. There are no bridges in the county.

Indianapolis, Ind.—We are told that the Indianapolis & Martinsville Rapid Transit Co. will soon be in the market for two bridges. Chas. Finley Smith, President.

Jacksonville, Fla.—It is reported that the County Commissioners will soon want bids for a bridge over a creek in Jacksonville.

Kansas City, Mo.—The Union Depot, Bridge & Terminal R. R. Co., of Kansas City, with a capital stock of $8,000,000 was chartered on May 10. This is the company in which Theo. C. Bates, of Boston, is interested, and which has plans to build a three-deck bridge on the piers of the old Winner bridge over the Missouri River; also build a depot in Kansas City.

Marietta, Ohio.—Herman Laub, of Pittsburgh, Pa., is reported to have made plans for the bridge proposed by the Marietta & Williamstown Bridge & Transportation Co. over the Ohio River between the places named.

Mittineague, Mass.—The Eastern Bridge & Structural Co., of Worcester, Mass., has a contract for the steel bridge over Westfield River at $16,500. (April 5, p. 244.)

Montezuma, Ga.—The County Commissioners have decided to build a new iron bridge across the Flint River to take the place of the old ferry.

Monticello, N. Y.—The Monticello, Fallsburg & White Lake R. R., mentioned under Railroad Construction, will need a bridge of about 100 ft. across Mongaup River. Chas. N. Fuller, Monticello, N. Y., is General Superintendent.

Montreal, Que.—The story has been revived that the St. Lawrence bridge at Montreal will shortly be put under contract. Mr. C. N. Armstrong, 16 St. Sacrament street, Montreal, can give information about it. It has also been said that Mr. Edward S. Shaw, Consulting Engineer, 12 Pearl street, Boston, Mass., has prepared plans. It is true that Mr. Shaw made a competitive design for this bridge some six years ago, but we do not learn that this has been forwarded to such shape as to be ready to submit for bids, nor do we learn that the necessary financial arrangements have been made for letting contracts.

Newburyport, Mass.—The Committee on Roads and Bridges of the Legislature has reported the bill for rebuilding the bridge over the Merrimac River between Newburyport and Salisbury. The total cost is not to exceed $15,000, and the Haverhill & Amesbury Street Ry. will pay 7½ per cent. of the expense.

New Haven, Conn.—The Board of Aldermen has accepted the report of the Committee on Railroads and Bridges recommending a stationary bridge over Mill River at Grand avenue, to replace the Barnesville bridge. Cassius W. Kelly, City Engineer.

New York, N. Y.—Bids are wanted, May 20, for the drawbridge over Mott Haven Canal at 135th street. Total length, 59 ft.; estimated cost $30,000. John L. Shea, Commissioner of Bridges.

Mayor Van Wyck has approved an issue of $644,495 bonds for a high level bridge over Newtown Creek at Vernon avenue, Queens to Manhattan avenue, Brooklyn. The plans include a viaduct approach over the tracks of the Long Island R. R. The War Department has approved the plans and the Commissioner of Bridges, John L. Shea, will probably want bids shortly.

Oswego, N. Y.—Proposals will be received at the Department of Works until 2 p. m., May 27, for building the east approach to the lower bridge, and for straightening the present iron bridge over the Hydraulic canal on Bridge street. The plans are with the City Engineer. E. A. Cooke, Clerk, Department of Works.

Ottawa, Ill.—A street railroad now building between Ottawa and Marseilles will need a bridge over Fox River at East Ottawa.

Pauling, Ohio.—The County Commissioners will build the following new bridges, each at a cost of about $1,000: One across Blue Creek at its mouth, one across Blue Creek on the Van Wert Pike, one across Flat Rock three miles west of Payne, and two short spans on the Oakwood bridge across the Auglaize River at Oakwood.

Pine Grove, Mich.—The Knox bridge has been condemned. A new one will be put in soon.

Pittsfield, Mass.—Collins & Norton, of Springfield, have made plans for the bridge over the Housatonic River at South street, for the Pittsfield Electric Street Ry.

Pittsburgh, Pa.—Sealed proposals will be received until 12 m., May 17, for the superstructure and masonry of one steel arch viaduct and two steel through plate-girder highway bridges, and for five stone arch bridges. Bridge contractors are asked to visit and examine the sites before bidding. The approximate quantity of masonry is about 2,400 cu. yds. Plans and specifications may be seen and forms of bond obtained at the office of Charles Davis, County Engineer. W. E. Thompson, County Comptroller.

According to report, the Wilmot street bridge will be advertised shortly. The estimate is between $140,000 and $150,000. It will have a two-hinged arch central span of about 450 ft., with steel trestle approaches at both sides, and will be 150 ft. above the bottom of the valley.

The Council has passed an ordinance to allow the Pittsburgh & Birmingham Traction Co. to use the new South Tenth street bridge. The bridge will be 60 ft. wide.

Philadelphia, Pa.—It is proposed to build a bascule bridge at Passyunk avenue over the Schuylkill River. There is an appropriation of $75,000 to begin work on the structure.

The Park Commission has authorized the building of an approach to the west side of Spring Garden bridge at a cost of $40,000.

Redwood Falls, Minn.—The Supreme Court has ordered a bridge across the Minnesota River between the towns of Swedes' Forest and Sacred Heart. The County Commissioners will soon let the contract.

Rexford Flats, N. Y.—The Governor has signed the bill appropriating $15,000 for a steel bridge over the Upper Mohawk aqueduct near Rexford Flats, which will be built under the supervision of the Superintendent of Public Works.

Saginaw, Mich.—The Board of Public Works has approved the plans and specifications for a bridge over Saginaw River at Genesee street. We are told that bids will probably be wanted immediately after the plans are approved by the Common Council. It is to be of arched girders and bascule draw span, the total length of steel to be 480 ft. There will be two masonry approaches, each 120 ft., making the total length of the bridge 720 ft. The estimated cost is $186,500. H. E. Terry, City Engineer.

Sault Ste. Marie, Ont.—The bill to incorporate the St. Mary River Bridge Co. has been reported favorably in the Canadian Parliament. The incorporators are: Messrs. Hugh Blain, William George Francis, Newton W. Rowell, William Morris, George H. Parkes and Joseph Parkins Thompson, of Toronto. Before being allowed to build, the company will be required to secure permission from the United States to build on that side of the river. The proposed bridge is to have a carriageway, street railroad tracks, and foot walks. The capital stock of the company is $500,000, with bonding powers for $1,000,000, and the office is in Toronto. It is proposed to build a bridge with a 200-ft. draw. (April 5, p. 244.)

Shamokin, Pa.—The Northumberland County Commissioners are considering building a bridge on Market street, with a 70-ft. span 140 ft. wide.

Topeka, Kan.—Sealed bids will be received by the Board of County Commissioners of Shawnee County in Topeka until noon of May 31, for building two steel bridges over Kansas River, one south of Rossville and the other at Oakland, according to the plans and specifications on file in the office of John M. Wright, County Clerk. Each bridge will cost about $20,000. Both bridges will be built on tubular steel piers, with 16-ft. roadway and sidewalk. The Oakland bridge will have six spans; the other bridge five spans. Scott Kelsey is Chairman of the Board of Commissioners.

Woodsdale, Ohio.—The contract for the bridge over the Miami River is reported about to be let by the County Commissioners. The cost is estimated at $37,278, by L. A. Dillon, Engineer.

Other Structures.

Bay City, Mich.—The Pere Marquette R. R. is reported to have requested the city to resume negotiations relative to a new passenger station for that road in Bay City.

Carnegie, Pa.—P. K. Jamison and associates is reported to have bought a site at Carnegie for a plant for the American Nickel Steel Co., of which he is President.

Charleston, W. Va.—We are told that the Toledo & Ohio Central and the Kanawha & Michigan propose to build a new passenger station at Charleston some time during this year, but as yet the plans are not made.

Chicago, Ill.—The Inland Steel Co., of Chicago, has increased its capital stock to $1,500,000 to build a plant to make billets and merchant bars. The plant will be located on the lake front near South Chicago, and will have an annual capacity of about 125,000 tons. It is expected that the plant, which will include four 50-ton furnaces, blooming mill, billet mill and finishing mills, will be in operation at the end of the present year.

In February we mentioned that the Chicago & Northwestern was preparing elaborate plans for a suburban station to cost about $1,000,000. It is now said that Messrs. Frost & Granger, architects, of Chicago, are working on the preliminary drawings.

Dayton, Ohio.—The C., H. & D. will build a new freight depot here during the summer, according to report.

Fairmount, Ohio.—The Lunkenheimer Co. inform us that they are building a second factory building at this place, which is intended to take care of the departments which have not found places in the building erected last year. The buildings now under construction will have a total floor space of about 400,000 sq. ft. The buildings will consist of a two-story main factory building, a one-story brass factory, one-story engine and boiler room and several other buildings designed for special purposes. These buildings will be pressed brick throughout and the construction will be of modern type.

Fort Worth, Texas.—It is announced that the Texas & Pacific will build a freight warehouse here to cost $100,000. The plans also contemplate yard extensions.

GREENWICH, CONN.—The N. Y., N. H. & H. will build a new passenger station in Greenwich. According to reports, sites are being considered.

KANSAS CITY, MO.—Messrs. Pierce, Richardson & Neiler, Consulting Engineers of Chicago who made the plans and estimates for the two new power houses of the Metropolitan Street Ry. Co., and the Kansas City Electric Light Co., have given out a partial list for a large amount of material which will be bought for these two tower plants.

See also "Bridge Building" above.

KNOXVILLE, TENN.—It is reported that the Southern Ry. will receive bids during May for a passenger station for Knoxville. It will be of brick instead of white marble as at first intended.

MINNEAPOLIS, MINN.—Foster & Smith have the contract for the new freight house for the Chicago, St. Paul, Minneapolis & Omaha in North Minneapolis. The building is to be 50 x 800 ft., and 29 ft. high. It will be a two-story building, and of brick, and will cost $80,000.

OKOLONA, MISS.—Fire, on May 2, destroyed the Mobile & Ohio R. R. depot, eight freight cars and considerable merchandise.

PHILADELPHIA, PA.—Wm. Steele & Sons, architects, are receiving estimates for an extension to the plant of the Geo. V. Cresson Machine Foundry Co.

A. & P. Roberts, according to report, are making plans for additions to the Pencoyd Iron Works.

The Midvale Steel Works proposes extensive improvements to its plant. Plans have been filed with the Building Department for machine shop No. 3, which is to be one-story high, 164 x 324 ft.

PITTSBURGH, PA.—James W. Brown, formerly Vice-President of the Crucible Steel Co., but now interested in a company to build a crucible steel plant, is reported to have secured a site on the Pittsburgh & Lake Erie road near South Monaca. The formal organization of the new company has not been announced.

ROCHESTER, N. Y.—New car shops are to be built this year by the Rochester (Electric) Railway Co. in St. Paul street on the site of the old car barns, at a cost of about $200,000. Plans are now under consideration for a one-story structure 173 ft. wide and 200 ft. long.

SCHENECTADY, N. Y.—The Delaware & Hudson proposes to build a new freight house on the site of the old Maxim grain elevator. The station will be 30 x 400 ft., and cost about $25,000.

WHEELING, W. VA.—The La Belle Iron Works recently increased its capital stock from $800,000 to $2,500,000. The concern has recently finished a new skelp mill at Steubenville, Ohio, and is about to contract for a tube mill to make all sizes of tubes.

WILMINGTON, DEL.—The car shops of the Pullman Co. in Wilmington will be enlarged.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Canadian Society of Civil Engineers.

At the ordinary meeting, on Thursday, May 9, a paper was presented by Mr. C. B. Smith, on "Discharge of Sewage from Toronto Sewers in 1900."

The Engineers' Club of Philadelphia.

A regular meeting of the Club will be held on Saturday, May 18, at 8 o'clock p. m. The papers are: Fire-Proof Construction in Philadelphia, illustrated, by Edwin F. Bertolett; The Use of Expanded Metal in Fire-Proof Construction, illustrated, by James S. Merritt.

New York Railroad Club.

The next regular meeting of the Club, and the last for the season, will be held at No. 12 West Thirty-first street, New York, at 8 o'clock p. m., of Thursday next, 16th inst. The paper of the evening will be presented by Mr. F. F. Gaines, Mechanical Engineer, Lehigh Valley R. R., and is entitled "Increasing the revenue train load by the use of large capacity cars and improvements in construction and maintenance of details."

The American Society of Mechanical Engineers.

The forty-third meeting of the American Society of Mechanical Engineers will be held at the Plankinton House, Milwaukee, Wis., May 28 to 31. The railroad fares will be as usual, 1½ fare for the round trip on the certificate plan. A special car or cars will be run from New York over the Pennsylvania Railroad, the accommodation to be according to the number of people expressing their wish to go that way. The programme of papers to be presented follows:

Aldrich, W. S.—Requirements of Electricity in Manufacturing Work.
Riddell, John.—Portable Versus Stationary Machine Tools.
Report of Committee on Standardization of Methods of Making Engine Tests.
Hutchinson, George A.—The Practical Application of Superheated Steam.
Foster, E. H.—Superheated Steam.
Ball, F. O.—Drafting Room and Shop Systems.
Reist, H. G.—Blue Printing by Electric Light.
Robinson, A. W.—Rules for Drawing Office.
Rossi, A. J.—Influence of Titanium on the Properties of Cast Iron and Steel.
Reed, William E.—A Few Instruments of Precision at the Paris Exposition of 1900.
Miller, Fred J.—Bevel Gear Cutting Machines at Paris.
Bull, Storm.—The Locomotive Exhibits at the Paris Exposition of 1900.
Hunt, C. W.—New Connecting Rod End.
Marr, George H.—Method of Filing and Indexing Engineering Literature, Notes, Data, etc., etc.
Webber, William O.—A Filtration Plant at Albany, N. Y.
Webber, William O.—Tests of An Hydraulic Air Compressor.
Bardwell & Hamilton.—The Bardwell Votometer.
Benjamin, Charles H.—Some Experiments on Ball Step-Bearings.
Stillman, F. H.—Pulley Press Valve.
Astrom, J. I.—Determination of Fly-Wheels to Keep the Angular Variation of An Engine Within a Fixed Limit.
Russell, W. S.—A Special Form of Boring and Facing Machine.
Robertson, C. H.—Efficiency Tests of 125 h.-p. Gas Engine.
Fordyce, J. R.—A Method of Preparing and Baling Cotton in Round Bales.
Wood, M. P.—Protecting Ferric Structures.
Daniels, F. H.—An Improved Type of Ingot-Heating Furnace.
Suplee, H. H.—The Entertainment of the Visiting Engineers in Europe in 1900.

Under escort of sub-committees of the local members trips will be made through the plants of The Edward P. Allis Co., Nordburg Manufacturing Co., and other works in the vicinity; or through the shops of Filter & Stowell Mfg. Co., and Vilter Mfg. Co. Trips can also be made to the works of the Christensen Engineering Co., and the Bucyrus Co., at South Milwaukee.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Hon. J. C. Faulkner has been appointed a member of the New Hampshire Railroad Commission, succeeding Mr. J. G. Bellows, who has resigned on account of ill health.

—Mr. A. F. Banks, President of the Chicago, Lake Shore & Eastern and the Elgin, Joliet & Eastern, was born Jan. 31, 1861. He entered the service of the St. Louis & Southeastern as an office boy in 1877, becoming Contracting Agent in 1879. From 1888 to 1889 he was General Freight Agent of the Central Iowa, then he became General Freight and Passenger Agent, later becoming Traffic Manager. Mr. Banks was appointed Traffic Manager of the Elgin, Joliet & Eastern in 1893, and six years later his jurisdiction was extended over the Chicago, Lake Shore & Eastern.

—Mr. B. F. Dickson, who, on May 1 last, became Assistant General Superintendent of the Mexican National, was born in South Carolina March 13, 1859, and was graduated from the University of Alabama in 1879. He became Assistant Engineer in 1881 on the Texas Mexican and the Texas Western. In 1884 he entered the service of the Louisville & Nashville as clerk and was promoted to general land agent in 1887. The next year he was appointed Principal Assistant Engineer on Construction in Alabama, later becoming Superintendent at Evansville. Mr. Dickson then served for a time in the army and after being mustered out became Superintendent of Construction for the Quartermaster General in Cuba and served in China on relief expedition, resigning in January, 1901.

—Mr. F. N. Hibbits, recently appointed Mechanical Engineer of the Union Pacific, was formerly connected with the Erie. Mr. Hibbits is a native of Indiana and is 35 years old. He is a graduate of the Rose Polytechnic Institute at Terre Haute, Ind., and entered railroad service in 1886 as a machinist and draughtsman on the Cleveland, Columbus, Cincinnati & Indianapolis. This position he held until August, 1891, when he was appointed Engineer of Tests on the New York, Lake Erie & Western. The next year he became Mechanical Engineer, later becoming Master Mechanic. For four years (1895-1899) he was freight trainmaster of the Erie, secretary to the New York, Lake Erie & Western, and in June, 1899, was appointed Superintendent, at Carbondale, Pa., of the Erie.

—Mr. H. W. Parkhurst, recently Engineer of Construction of the Illinois Central, became Engineer of Bridges and Buildings on the same road on May 1. Mr. Parkhurst was born June 25, 1847, at Boston and was graduated from Brown University, Providence, R. I. He entered railroad service in 1870, but nearly all of his work has been in bridge work, either for railroad companies or for contractors. He has been engaged on some of the most important bridges over the Mississippi and Missouri Rivers. He has, however, had considerable experience in location and construction. From 1892 to Jan. 1, 1901, he was Engineer of Bridges and Buildings on the Illinois Central, then became Engineer of Construction, and now in the later changes becomes again Engineer of Bridges and Buildings.

—Mr. Philip Syng Justice died in London on May 5. Mr. Justice was 82 years old and had lived in London for the last 25 years. For many years before that, however, he was an important figure in the development of manufactures in the United States, and particularly in heavy railroad material. When he was about 25 he became one of the firm of Steinmetz & Justice, which built up a large trade in hardware. About 1855 he established the firm of Philip S. Justice & Co., dealers in and importers of heavy railroad material. It is said that his firm imported the first steel rails ever brought to America, as well as the first welded steel tires for locomotives. (The first weldless steel tires were imported by Mr. Prosser.) The firm is still in existence in Philadelphia. About 1866 he established, with the help of the Philadelphia & Reading and certain business friends, the Butcher Steel Works, of Nicetown, now the Midvale Steel Works, and he was the first President of the company, and at these works was made the first steel tire in the United States, or, at any rate, the first to be made in a commercial way. We hold Mr. Justice in especially kind remembrance, because he was one of the earliest to recognize the uses of a scientific railroad paper. Thirty years ago, when the *Railroad Gazette* was changed to its present form, and was first seriously devoted to the science and art of railroading, Mr. Justice was one of the first to recognize the value of such a publication and use it by substantial advertising.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—D. L. Gallup, heretofore Cashier, has been appointed Comptroller. James Collinson has been appointed Assistant Superintendent of Machinery, succeeding R. P. C. Sanderson, resigned, effective May 15.

Baltimore & Ohio.—James McCrea and Samuel Rea, of the Pennsylvania, have been elected Directors of the B. & O., succeeding J. J. Hill and C. H. Tweed, resigned.

Baltimore & Potomac (Philadelphia, Wilmington & Baltimore).—G. C. Wilkins has been elected President.

Butte, Anaconda & Pacific.—H. Spencer has been appointed General Superintendent.

Central of Georgia.—J. W. Comer, Purchasing Agent, with headquarters at Savannah, Ga., has resigned.

Central of New Jersey.—C. H. Warren, heretofore First Vice-President, has been elected Vice-President and G. O. Waterman becomes Secretary and Treasurer, succeeding S. Knox and J. W. Watson, respectively. S. M. Williams, Second Vice-President and Comptroller, has resigned. The position of Comptroller having been abolished the duties of that office will be assumed by the General Auditor. W. W. Stevenson, heretofore Auditor of Disbursements, has been appointed General Auditor, effective May 13.

Chicago & Alton.—F. G. Jonah, Engineer Maintenance of Way, with headquarters at Bloomington, Ill., has resigned.

Chicago Great Western.—William B. Causey has been appointed Division Engineer of the Southwest Division, with headquarters at Des Moines, Iowa, effective May 9.

Cincinnati, Hamilton & Dayton.—A. J. Ball having resigned as Assistant Superintendent of Motive Power, the position has been abolished. J. C. Homer has been appointed Master Mechanic, with headquarters at Cincinnati, Ohio, and W. H. Sloat becomes Master Mechanic at Dayton, Ohio, effective May 15.

Great Northern.—A. H. Hogeland, Resident Engineer at St. Paul, Minn., has resigned.

Harriman & Northeastern.—At a meeting held recently B. M. Robinson was elected President and H. M. Winslow, Vice-President.

Lake Erie, Alliance & Wheeling.—The officers of this company are: President, C. Morris; Vice-President, J. E. Newell, and Secretary and Treasurer, H. A. Garfield. (R. R. Construction column, March 29, p. 230.)

Missouri, Kansas & Texas.—The Sherman, Shreveport & Southern having been absorbed by this company C. L. Harris heretofore Trainmaster, becomes Superintendent of the Fort Worth, Henrietta & Denton Division, and Sherman Branch, at Denison, Texas. E. M. Alvord, heretofore Superintendent of the S., S. & S., becomes Superintendent, with headquarters at Greenville, Texas, of the Shreveport Division, which embraces all of the S., S. & S. road from Shreveport to McKinney, and that part of the M., K. & T. between Greenville and Mineola. J. M. Walton, heretofore Trainmaster of the M., K. & T., becomes Superintendent, at Hillsboro, of the Dallas and Waco Divisions. T. S. McDowell will remain at Smithville as Superintendent of the San Antonio Division, which comprises all of the main line south of Smithville and the old San Marcos branch and the new San Antonio extension.

Monticello, Fallsburg & White Lake.—The officers of this company, referred to in the Construction column, are: President, Theodore B. DuBois, 45 Gould avenue, Newark, N. J.; First Vice-President, John L. Somner, Pearl street, Newark: Second Vice-President, John Colyer, Colyer Carriage Co., Halsey street, Newark; Secretary and Treasurer, Frank X. Keiling, 175 Halsey street, Newark; General Counsel, Walter J. Knight, Prudential Bldg., Newark; Associate Counsel, Hon. Geo. H. Smith, Monticello, N. Y.; Engineer, Irving Righter, Port Jervis, N. Y.

Nevada County Narrow Gage.—At a meeting held May 7, Mrs. J. F. Kidder was elected President, succeeding her husband, the late J. F. Kidder. At the same meeting P. Johnston was elected Vice-President and F. J. Beatty, Secretary. J. H. Coughlin has been appointed Auditor.

Ohio & Little Kanawha.—J. N. Wilson, Auditor, with headquarters at Zanesville, Ohio, has resigned.

Oregon Short Line—F. W. Hills, Auditor, with headquarters at Salt Lake City, Utah, has resigned.

Pennsylvania.—S. P. Hutchinson, Assistant General Agent, with headquarters at New York City, has resigned, effective May 14.

Plant System.—S. S. Fitzsimmons, heretofore Superintendent at Montgomery, Ala., has been appointed Fuel Inspector, with headquarters at Waycross, Ga. J. E. Crosland has been appointed Assistant General Freight Agent at Savannah, Ga., succeeding W. C. Dennis, resigned.

Southern Pacific.—W. C. Ambrose, Resident Engineer, with headquarters at Bakersfield, Cal., has resigned. F. L. Bates, Master Mechanic at San Francisco, Cal., has resigned.

Wheeling & Lake Erie.—Jos. Ramsey, Jr., Vice-President and General Manager of the Wabash, becomes President of the W. & L. E. also. H. B. Henson was elected Treasurer.

Wisconsin Central.—W. L. Bull has been elected Chairman of the Board, succeeding the late Mr. Coppell.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARKANSAS ROADS.—The Cosset Lumber Co., of Hamburg, is reported having decided to build about 35 miles of railroad, tapping its tract of yellow pine land in Arkansas.

ALABAMA, TENNESSEE & NORTHWESTERN.—This company has been organized to build a railroad from Florence, Ala., to Clifton, Tenn., about 80 miles, including several branches. J. L. Bell, of 29 Broadway, New York, is President.

CANADIAN ROADS.—The bills incorporating the following companies have been reported favorably by the Railway Committee of the Privy Council of the Dominion of Canada: Vancouver, Westminster & Yukon; Kootenay; Central; Simalkameen & Keremeos; Northern Pacific & Manitoba; Winnipeg Transfer; Portage & Northwestern; Waskada & Castine.

CHARLES CITY.—This company has been incorporated in Iowa with a capital stock of $100,000 to build an electric road from Charles City to Powersville, and either to Greene or Clarksville. The directors are: C. D. Ellis, Ed. Werder, George May, G. W. Dawson, P. H. Powers, W. E. Waller and S. L. Kern.

CHICAGO & NORTHWESTERN.—An officer writes that the company is building a connecting link from the Madison Division at Milwaukee, in conjunction with the Chicago, Milwaukee & St. Paul, connecting with that company's old LaCrosse division. The track is 2½ miles long and will be used for the location of industries. (May 10, p. 323.)

CHICAGO GREAT WESTERN.—The survey is completed for the extension from Hampton, Iowa, west about 27 miles to Clarion. (May 3, p. 307.)

Surveys are in progress for an extension from Fort Dodge, Iowa, southwest across the state. Another line is being run from Harlan, Iowa, to Council Bluffs. (April 19, p. 275.)

CHICAGO, MILWAUKEE & ST. PAUL.—The company is making preparations for improving the division from Sioux City, Iowa, to Yankton, S. Dak. The 60-lb. rails are to be replaced with 75-lb. steel, and all the wooden bridges are to be replaced with steel bridges on stone abutments. Work is to be begun about June 1.
See also Railroad News column.

DAYTON, SPRINGFIELD & URBANA ELECTRIC.—Most of the stockholders of this company are stockholders of the Urbana, Bellefontaine & Northern, which is projected from Urbana north through West Liberty to Bellefontaine. Preliminary surveys are made. The contract for grading, track laying, bridging, etc., will be let during the next 30 days. (May 3, p. 307.) The maximum grade is 3 per cent., and the maximum curve 3 deg. (Official.)

DENVER, BOULDER & NORTHERN.—Efforts are being made to revive this proposed electric line from Denver, Colo., to Boulder and Greeley, about 87 miles. James F. Monday, of Denver, is President. (Construction Supplement, March 8, 1901.)

DES MOINES, IOWA CITY & EASTERN.—James Wilson, Chief Engineer, reports that he has found a feasible route from Des Moines, Iowa, via Prairie City, to Montezuma. The route runs due east a distance of from six to 12 miles from the main line of the Chicago, Rock Island & Pacific. (April 26, p. 292.)

DETROIT & TOLEDO SHORT LINE.—This company has been incorporated in Michigan, with a capital stock of $1,000,000, to build a continuation of the Toledo & Monroe, an electric line now in operation from Toledo, Ohio, north to Monroe. The extension is to run to Detroit, in all about 55 miles. The principal stockholders are: C. A. Black, J. M. Mukkey and A. E. F. Hoyt, all of Detroit. There is no connection between this line and the Detroit & Toledo Shore Line now owned by the Everett-Moore Syndicate. (May 3, p. 307.)

FLORIDA WEST COAST.—Application has been made for a charter to build this line in Florida from Tampa south about 60 miles along the coast of Tampa Bay to Braidentown. T. C. Talafero, President of the First National Bank of Tampa, is President. Ralph C. Caples, of New York, is Vice-President and General Manager.

FORT WAYNE BELT & TERMINAL.—This company has been organized in Indiana, with a capital stock of $1,000,000, to build a belt and spurs at Fort Wayne.

GREAT NORTHERN.—Surveys are reported in progress for the Crows Nest Southern line from Jennings, Mont., north into the Crows Nest coal fields in British Columbia. (C. N. S., April 26, p. 292.)

ILLINOIS CENTRAL.—Surveys are in progress for a line from Cedar Rapids, Iowa, south eight miles via Weston and Washington to Coppack, Henry County.

INDIANAPOLIS & MARTINSVILLE RAPID TRANSIT.—Surveys are made and grading will be begun as soon as possible on this proposed electric line from Indianapolis, Ind., southwest 30 miles via Mooresville to Martinsville. Charles Finley Smith, of Indianapolis, Ind., is President. (May 3, p. 307.) Emmet M. Smith is Vice-President and Treasurer. (Official.)

INTERPROVINCIAL & JAMES BAY.—The Dominion Parliament has cut down this proposed line from 300 miles to 70 miles on account of there being competing lines on the same route. The charter as granted is for a line from Lumsden's Mills on Lake Temiscamingue to Rivere Quinze. (April 19, p. 295.)

INVERNESS & RICHMOND.—The Inverness (N. S.) County Council has decided against granting this company an extension of six months from June 14 for completing its line from Port Hastings, N. S., to Broad Cove. The company was to receive $1,000 per mile if completed at that time. (Construction Supplement, March 8, 1901.)

KANSAS CITY & ST. JOSEPH ELECTRIC.—The company has made a mortgage in favor of the International Trust Co., Boston, and the U. S. Trust Co., Kansas City, trustees, to secure $1,500,000 5 per cent. 30-year bonds, dated April 1, 1901, for building its proposed electric line from Kansas City, Mo., north 47 miles via Parkville, Platte City, Dearborn and Faucett to St. Joseph. P. A. Gibson, of Erie, Pa., is President and Chas. E. Gibson, of Kansas City, Vice-President. (Construction Supplement, May 3, p. 307.)

KETTLE RIVER VALLEY.—The Railway Committee of the Privy Council has reported this bill for a new line in British Columbia requiring that building be begun within two years and completed in five. Among those interested are J. R. Stratton, of Petersboro, Ont., and Christopher Kloepfer, of Guelph. (Construction Supplement, March 8, 1901.)

LONG ISLAND.—Jacobs & Davies, engineers of the Atlantic Avenue Improvement Commission, have been at work preparing working plans for bidders for building the tunnel and elevated road on Atlantic avenue, Brooklyn. (April 12, p. 259.)

LOS ANGELES SUBURBAN.—This company has been incorporated in California, with a capital stock of $1,000,000, to build connecting electric lines about Los Angeles and the suburban cities. W. H. Batcheler, of Chicago, is interested.

LOUISVILLE, ANCHORAGE & PEWEE VALLEY.—Amended articles of incorporation have been filed in Kentucky, increasing the capital stock from $10,000 to $350,000, and it is proposed to begin building soon. The road is projected from Louisville northeast about 20 miles via Anchorage to Pewee Valley. (Construction Supplement, March 8, 1901.)

LOUISVILLE & NASHVILLE.—Bids are in for the Alabama & Florida extension from Geneva, Ala., to Graceville, on the line towards Marianna, Fla., 45 miles. (Construction Supplement, March 8, 1901.)

MACON, DUBLIN & SAVANNAH.—The City Council of Macon, Ga., has granted terminals to this company on condition that the company begins work on extending its road to Savannah within six months and completes the same within one year thereafter.

MAUCH CHUNK, LEHIGHTON & SLATINGTON.—The directors have awarded a contract for building this electric road from Mauch Chunk, Pa., over the Flagstaff Mountain and through the valley of Lehighton, and work is to be begun at once. The road is projected through Lehighton, Weissport, Perryville & Palmerton to Slatington, 20 miles.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—An officer writes that the company intends to extend its line from Wishek, N. D., south 20 miles to Ashley. There will be no extension to Aberdeen, as reported. (May 3, p. 308.)

MONTICELLO, FALLSBURG & WHITE LAKE.—This company's proposed electric line is to run from Fallsburg, N. Y., on the New York, Ontario & Western, through Kiamesha Lake to Monticello, Sullivan County, thence along Mongaup Valley to White Lake, about 18.3 miles. Surveys are completed and application has been made to the Board of Railroad Commissioners for right of way. Bids will be asked as soon as the Commissioners give consent to build. The maximum grade is 3 per cent. It will be standard gage and will permit the switching of New York, Ontario & Western freight trains without breaking bulk. There will be one bridge about 100 ft. across the Mongaup River. Plans and specifications are at the company's general office in Monticello, N. Y., in charge of Mr. Chas. N. Fuller. (May 3, p. 308.) The officers of the company are given under Elections and Appointments. (Official.)

MONTREAL & SOUTHERN COUNTIES.—The Dominion House Committee has reported without amendment this company's bill permitting connection with other lines, but provides that it 15 per cent. of the capital is not spent on the road before July 1, 1903, and the road completed before July 1, 1908, the charter is to lapse. (Feb. 22, p. 136.)

NASHVILLE & CLARKSVILLE.—This company has been incorporated in Tennessee by Jere Baxter and others connected with the Tennessee Central, to build the proposed line from Nashville to Clarksville, 50 miles. The city of Nashville recently voted a subsidy to the Nashville, Florence & Northern for a similar line, but owing to injunction proceedings, the subsidy is not available. (N., F. & N., Construction Supplement, March 8, 1901.)

NORTH CAROLINA ROADS.—The M. B. Wilkinson Lumber Co., of Asheville, N. C., is reported interested in the proposed line from Morganton into Burke County, about 12 miles, to reach timber land.

NORTHERN OHIO TRACTION.—The Everett-Moore Syndicate which owns this line, is reported making arrangements to extend it from Akron, Ohio, southeast through Massillon, Navarre, Bolivar, New Philadelphia, Uhrichsville and St. Clairsville to Wheeling, W. Va. The central office is Akron, Ohio. (Construction Supplement, March 8, 1901.)

NORTHERN PACIFIC.—An officer writes that surveys are in progress for the proposed extension from Hoquiam, Wash., to run west along the north shore of Gray's Harbor and thence north along the Olympic Peninsula to the Strat Juan de Fuca. It is probable that the first section of 25 miles will be built this year. (May 3, p. 308.)

OHIO & INDIANA.—This company was incorporated in Indiana May 7, with a capital stock of $50,000, to build a railroad from Portland, Jay County, through Montpelier to Bluffton, Wells County, 40 miles, with a spur to Camden. Wm. H. Shott is President, Adam M. Baron, Vice-President, and Charles F. Knowlton, Secretary.

OREGON RAILROAD & NAVIGATION.—Right of way is being acquired for the proposed extension from Portland, Ore., down the Willamette River to St. Johns, five miles. (May 3, p. 308.)

OREGON SHORT LINE.—With reference to improvements to be made along the line between Butte, Mont., and Pocatello, Idaho, an officer writes as follows: This line was originally constructed as a narrow-gage road. During the past 15 years material changes have been made, both in alignment and grade, at various points, and further changes are being made this year, to the extent of taking out sags and otherwise rectifying the grade for a distance of some 60 miles, and for about three miles of this distance an entire change of location will be made. (May 3, p. 308.)

PITTSBURGH, JOHNSTOWN, EBENSBURG & EASTERN.—Sealed proposals will be received, up to May 25, by T. W. Forsythe, Chief Engineer, at 713 Drexel Bldg., Philadelphia, for building 18 miles of line from a point near Janesville, Clearfield County, to a point near East Frugality, to be completed Dec. 1. For additional particulars, see our advertising columns.

ROCKFORD & BELVIDERE.—Kohler Bros., of the Fisher Bldg., Chicago, have been awarded the contract for grading, track laying and overhead work on this electric line from Rockford, Ill., east about 20 miles to Belvidere. Building was begun May 1. Fred A. Poor, Old Colony Bldg., Chicago, is Secretary.

ST. LOUIS SOUTHWESTERN.—An officer writes that the company has in contemplation the building of an extension from a point on its line five miles west of Renner, Tex., to the city of Dallas, about 13 miles. Preliminary surveys were made recently. (May 3, p. 308.)

SHAWNEE, OKLAHOMA & INDIAN TERRITORY.—The citizens of Guthrie, Okla. T., have raised $50,000 for this line on condition that it be completed and in operation from Guthrie southeast to Chandler, on the St. Louis & San Francisco, prior to Dec. 1. It is to be extended on south from Chandler through Shawnee and Oklahoma and Indian Territory into Texas. C. N. Points, of Shawnee, is President. (Construction Supplement, March 8, 1901.)

SOUTHERN.—Surveys are reported in progress for new yards at Harriman, Tenn.

SOUTHERN INDIANA.—An officer writes that work is begun on the coal branch 8.33 miles long, from a point on the main line about 1¼ miles south of Jasonville, Ind. It will require about three or four months to complete. (May 10, p. 324.)

SOUTH SHORE (CANADA).—This company has asked the Railway Committee of the Dominion Privy Council for an extension of seven years for completing its system, and seeks confirmation of the deed of sale to Hyacinthe Beauchemin of the right of way of the Montreal & Atlantic, forming lines from St. Michael de Yamaska to Sorel, and from the Parish of Ste. Anne to a point in Sorel; also confirmation of the sale of the Great Eastern to Raymond Prefontaine. The bill was passed without amendment. (Construction Supplement, March 8, 1901.)

SOUTHWESTERN OF ARIZONA.—The title of the Arizona & Southeastern has been changed to the Southwestern of Arizona and the company proposes to make the road standard gage and extend it on east to El Paso, Tex., about 220 miles. A branch is projected between Bisbee, Ariz., and Benson, 73 miles.

TOLEDO & WESTERN.—Arrangements are reported completed for building the Indiana Division of this electric line to run through Fayette to Angola, Ind. The road has been built from Toledo west to Sylvania, Ohio, and work is in progress on an extension from that point. (May 3, p. 308.)

TROY, RENSSELAER & PITTSFIELD.—This proposed electric line is to run from the city of Albany, N. Y., through Troy to Pittsfield, Mass., 35 miles. Surveys are under way. Plans are not yet completed for building. Hon. W. H. Draper, of Troy, is President, and W. D. Barnes, of Brainerd, N. Y., Vice-President. (May 3, p. 308.) The New York representative is ex-Governor Frank S. Black, 149 Broadway. (Official.)

UNION DEPOT, BRIDGE & TERMINAL OF KANSAS CITY.—This company has been incorporated in Missouri, with a capital stock of $8,000,000, to build terminals at Kansas City. Theo. C. Bates, of Worcester, Mass., and John M. Fox, of Kansas City, Mo., are interested.

WACO & NORTHEASTERN.—This company has been incorporated in Texas, with a capital stock of $60,000, to build a railroad from Waco northeast to a point at or near Ennis in Ellis County. The incorporators are: T. J. Anderson, A. W. Morton, I. V. N. Lee, W. A. Filed, W. W. Wilkes, L. Segur, F. M. Maxwell, A. M. Curtis, John W. Day, August Hunter, H. Robinson and J. J. Dean, all of McLennan County; P. A. O'Connor, of Victoria, Texas.

WARREN COUNTY.—The New York State Board of Railroad Commissioners has granted an increase of capital stock from $200,000 to $500,000, and for an issue of a first mortgage for $600,000. The proceeds will be used for new building. The ultimate intention is to run a line from Albany and Troy north about 65 miles to Warrensburg. (Warren County; also New York Roads, Construction Supplement, March 8, 1901.)

WASHINGTON ROADS.—Surveys are reported begun for a line from the Washougal mining district to a point on the Columbia River near Washougal. L. F. Russell, of Washougal, is interested.

WILKESBARRE & HAZLETON.—Building is reported begun on this proposed electric line in Pennsylvania, 27 miles long, between the two cities named. John B. Price, of Hazleton, is President. (Construction Supplement, March 8, 1901.)

GENERAL RAILROAD NEWS.

ATLANTA, KNOXVILLE & NORTHERN.—The Georgia Secretary of State has granted an amendment to the charter of this company to issue $1,500,000 preferred stock, dividends not to exceed 5 per cent.

AUGUSTA SOUTHERN.—The lease of this property to the South Carolina & Georgia was annulled on April 25, and the road has since been operated by its own officers. The Southern Ry. owns four-fifths of the capital stock and continues, therefore, to control the company. (Feb. 15, p. 120.)

CHICAGO GREAT WESTERN.—Notice has been given to the New York Stock Exchange of intention to issue $2,500,000 additional 4 per cent. debenture stock to provide for capital expenditures during 1901, and for car trusts created and payments made and to be made on rolling stock bought in 1900. Notice is also given of intention to issue $2,000,000 4 per cent. preferred stock B, for buying outstanding stock of the Wisconsin, Minnesota & Pacific. (April 12, p. 260.)

CHICAGO, MILWAUKEE & ST. PAUL.—The New York Stock Exchange has listed $8,815,300 additional common stock offered to stockholders in accordance with the circular of Feb. 28 last, and the proceeds are to be used in payment of building about 300 miles of railroad in Iowa, Wisconsin and Dakota, and about 16 miles of second track in Iowa, and Wisconsin; for buying real estate in Milwaukee and other points; for acquiring one-half interest in the Davenport, Rock Island & Northwestern, bought jointly with the Chicago, Burlington & Quincy, and providing funds for building a line from Mt. Carroll on the Council Bluffs Division in Illinois, to a point at or near Ottumwa on the Kansas City line, approximately 91.7 miles. (March 8, p. 178.)

KANSAS CITY & ATLANTIC.—Arthur C. Paine and Henry E. Bullard, intervenors in the foreclosure suit, have appealed to the U. S. Court of Appeals on the writ of error from the foreclosure decree. (Nov. 2, 1900, p. 732.)

KANSAS CITY & ST. JOSEPH ELECTRIC.—See Railroad Construction column.

KENTUCKY WESTERN.—Amended articles of incorporation have been filed with the Kentucky Secretary of State, increasing the capital stock from $100,000 to $200,000. (April 5, p. 246.)

MARSHFIELD & SOUTHEASTERN.—This line, extending from Nekoosa, Wis., to Marshfield, 33 miles, has been bought by the Wisconsin Central.

METROPOLITAN WEST SIDE ELEVATED (CHICAGO).—The $1,500,000 extension mortgage 4 per cent. bonds, maturing July 1, 1938, have been awarded to Otis, Wilson & Co., Chicago. The proceeds are to be used in extending the Garfield Park line from West Forty-eighth avenue to West Fifty-second avenue, one-half mile, and the Douglas Park branch to West Fortieth avenue, 1.85 miles. (April 19, p. 276.)

PHILADELPHIA, TRENTON & NEW YORK.—The Johnson Syndicate has bought the Trenton, Morrisville & Yardley Electric road which extends along the Delaware River for three miles on the Pennsylvania side, to form part of its proposed line connecting Philadelphia with New York. (Philadelphia & Lehigh Valley Traction, March 29, p. 230.)

QUEBEC & LAKE ST. JOHN.—The prospectus has been issued for the sale of the company's 4 per cent. prior lien bonds to the par value of £170,000 at 96. These are to be used to pay off a mortgage on the terminal property at Quebec and Hedleyville, and to improve the road. (Nov. 2, 1900, p. 732.)

RUTLAND.—N. W. Harris & Co., New York, and E. H. Rollins & Sons, Boston, announce that they will buy, prior to June 1, the first mortgage 6 per cent. bonds due Nov. 1, 1902, at a price equivalent to 3.3 per cent., income basis, equal on May 31 to $1,036 on each $1,000 bond, accrued interest being allowed up to the date of purchase. They also offer to receive these first mortgage 6s prior to June 1, giving in exchange new first consolidated 4½ per cent. bonds, due July 1, 1941, at 112 and accrued interest to date of exchange. (April 26, p. 292.)

VELASCO TERMINAL.—This property, at Velasco, Texas, was sold at foreclosure at Angleton, May 7, to Harris Masterson, of Houston, Texas, for $28,500. (April 26, p. 292.)